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# SUDAN

## Staple Food Market Fundamentals

2015



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## **About FEWS NET**

Created in response to the 1984 famines in East and West Africa, the Famine Early Warning Systems Network (FEWS NET) provides early warning and integrated, forward-looking analysis of the many factors that contribute to food insecurity. FEWS NET aims to: inform decision makers and contribute to their emergency response planning; support partners in conducting early warning analysis and forecasting; and provide technical assistance to partner-led initiatives.

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## Acronyms and Abbreviations

**ABS** Agricultural Bank of Sudan

**ACFSAM** Annual Crop and Food Supply Assessment Mission

**DRA** Darfur Development and Reconstruction Agency

**FAO** Food and Agriculture Organization of the United Nations

**FARMERS** Food and Agricultural Realtime Messaging and Reporting System

**FEWS NET** Famine Early Warning Systems Network

**FSTS** Food Security Technical Secretariat

**GoS** Government of Sudan

**IMF** International Monetary Fund

**kg** kilogram

**MoA** Ministry of Agriculture

**mm** millimeter

**MT** metric ton

**MMT** million metric tons

**NGO** nongovernmental organization

**RM** Remote Monitoring

**SDG** Sudanese pound

**SRC** Strategic Reserve Corporation

**SIFSIA** Sudan Institutional Capacity Programme: Food Security Information for Action

**USD** United States dollar

**WFP** World Food Programme

**WFP/VAM** World Food Programme Vulnerability Assessment and Mapping Unit

## Key Messages

- **The three main staple foods in Sudan are sorghum, wheat, and millet.** As a country, Sudan is structurally deficit in staple food production, although important commodity-specific and geographic differences exist. In aggregate terms, Sudan is surplus-producing in sorghum, self-sufficient in millet, and structurally deficit in wheat.

- Khartoum is the largest consumption center in Sudan, while the eastern Gedaref and Sennar States consistently produce a surplus (mostly in sorghum), which is sold

**elsewhere in the country and region, and regularly exported to the Gulf States (Figure 1).** The Darfur States were once self-sufficient in grain production. Many years of conflict and civil unrest have significantly disrupted production and marketing systems in Darfur, and the populations that remain there rely heavily on imports from elsewhere in the country and on relief commodities.

- **Despite many advances in agricultural production technologies (semi-mechanized and irrigated production schemes), local rainfall patterns remain a key driver in domestic food availability and prices.** Rainfall patterns can vary widely from year to year (up to 30 percent from average), resulting in highly variable production and market supply patterns.
- **Other factors that influence food availability and access (prices) include persistent civil unrest and conflict (particularly in Darfur and Kordofan States), the effects of longstanding economic sanctions, and macroeconomic instability most recently attributed to substantial reductions in government revenues from decreased oil sales.** Oil revenues are a main source of hard currency through which the Sudanese government makes purchases of essential goods for its population. The presence of economic sanctions makes it increasingly difficult for businesses engaged in sectors that are not directly affected (food and agricultural inputs) to carry out their activities.
- **The wheat marketing system is structured much differently than that of local cereals and includes two main channels.** The first is imported wheat, which accounts for 75-85 percent of wheat supply; the second is local

**Figure 1 Map of Sudan's states**



Source: WFP/VAM Sudan 2014.

production, which accounts for 15-25 percent of wheat supply). Imported wheat marketing involves strong linkages between three large milling firms and the Government of Sudan (GoS).

- **A decade of civil unrest and conflict have left the Darfur States relatively more isolated from the national staple food marketing system.** Local production and marketing systems have been significantly affected, resulting in major food deficits that are not always met through commercial trade flows.
- **Food aid (in-kind) appears to have had positive impacts on markets by assuring food supplies during years of production shortfalls and periods of severe crisis.** Recent anecdotal evidence indicates that the use of cash transfers and vouchers in 2013/14 (a very poor production year) may have aggravated food price increases and variability in the Darfur States.
- **Additional research is needed to understand the impacts of cash transfers and vouchers on markets and prices during years of good versus poor national grain production.** This will help inform the design of such programs in future years, when both local and national production are significantly below average. Additional research is likewise needed to understand the importance of livestock consumption in total grain demand. This will help improve the parameters used to estimate the annual national grain surplus, and hence external grain needs.



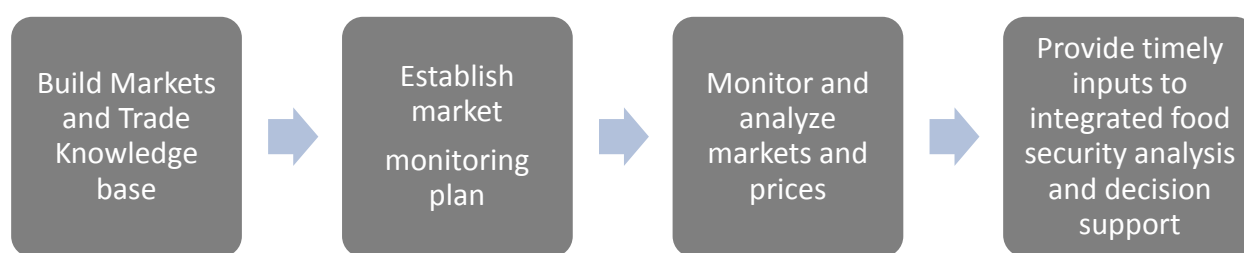


## Preface

**Markets and trade information and analysis are key inputs in FEWS NET’s integrated food security analysis.** FEWS NET relies on a common understanding of a given population’s livelihoods (food and income sources and typical coping strategies used to handle shocks) as well as an understanding of typical market conditions and outcomes. Together, these are used to identify and quantify the magnitude of market-based anomalies and their potential impacts on food security outcomes of the poor and very poor (Figure 2).

**Figure 2 FEWS NET’s approach to market monitoring and analysis**

### FEWS NET’s Approach to Market Monitoring and Analysis



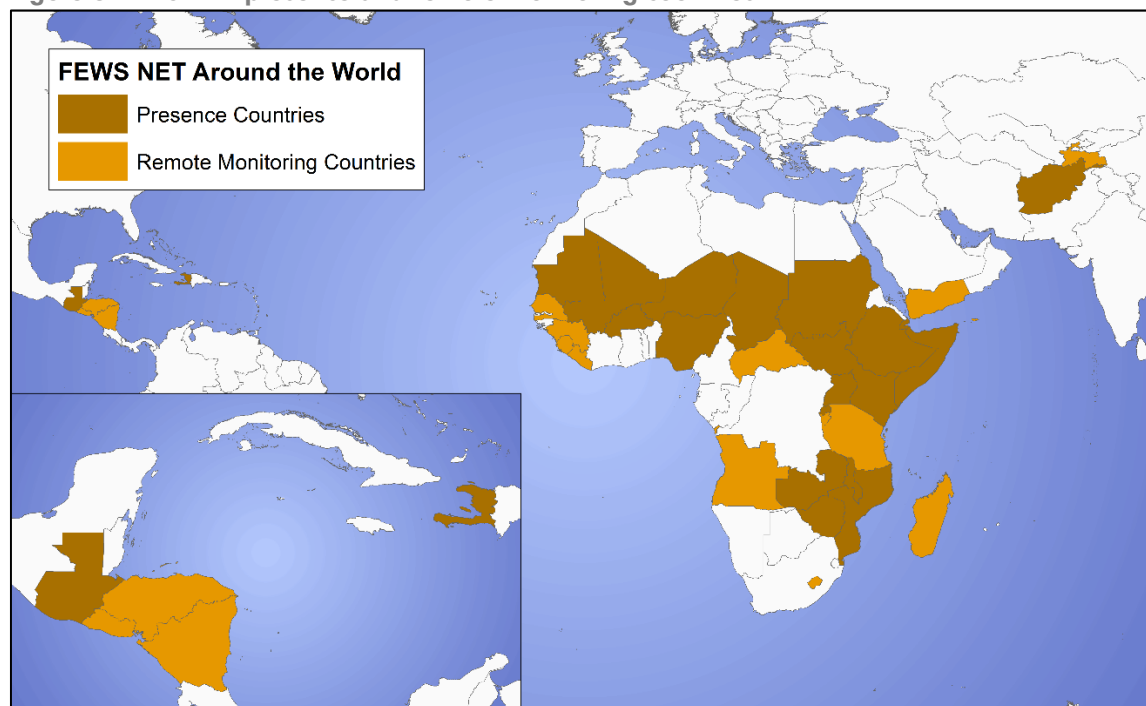
**Several types of information help inform the understanding of typical market conditions that affect the food and income sources of the poor and very poor.** These include: the **geography of supply and demand** for a particular commodity (for example, maize) or category of commodities (for example, staple foods); the **role of different actors in the marketing system** (from small-scale producers to industrial food processors); the **seasonality** of specific events or activities; **aggregate import-dependence**, particularly in the case of staple foods; and **key programs and policies**. These factors affect the stability of food availability and access (food prices and income levels) and therefore three of the four pillars of food security (food availability, access, utilization, and stability). Collectively, an understanding of these key elements constitutes the FEWS NET Markets and Trade Knowledge base.

**During FEWS NET III (FY 2012-FY 2016), Markets and Trade Knowledge base information is compiled into “Market Fundamentals” reports that seek to provide readers with a general understanding of market dynamics during a typical year.** These consolidated documents are elaborated for both presence and remote monitoring (RM) countries, with references to relevant external documents and resources when they are available. Two pilots were carried out in FY 2014, one in Sudan and one in Burkina Faso, to test the appropriateness of the approach, the usefulness of the end products, and the level of effort required.

**During the first year of rollout (FY 2015), the Market Fundamentals reports will focus largely on staple food market structure and behavior.** Such reports can be prepared for cash crop, livestock, and labor markets following a similar approach. Of particular interest to the FEWS NET project are markets identified as important sources of food and income for the poor and very poor based on an understanding of the livelihoods of those populations. The Markets and Trade Knowledge team’s vision is to eventually have a staple food Market Fundamentals report for each FEWS NET country and region. Other reports (focusing on cash crop, livestock, and labor markets) will be added in a modular fashion as time and resources permit.

**FEWS NET monitors markets in presence as well as remote monitoring (RM) countries.** A presence country is monitored by FEWS NET staff working in a local country office. RM countries are typically covered by analysts in a nearby country using a lighter analytical approach to identify anomalies and deteriorating conditions. FEWS NET also monitors staple food markets in other countries or regions that are relevant to understanding food availability and access for the poor and very poor in FEWS NET countries (for example, Benin, Pakistan, Kazakhstan, South Africa, and Mexico, among others).

**Figure 3 FEWS NET presence and remote monitoring countries**



Source: FEWS NET 2014.

The Market Fundamentals reports will continue to inform the project's regular market monitoring in terms of the commodities covered in the project's Markets and Trade Knowledge data warehouse, Price Bulletins, Price Watch, and special reports (Figure 2). The specific markets and commodities covered in country-specific reports will depend on a number of factors. The reports focusing on staple food markets touch on the following:

- **Cross-cutting issues that affect all markets in a given country or region:** The political and macroeconomic environment and key national-level programs and policies that influence food and income sources.
- **For each commodity market**
  - **Market structure**, including the relative importance of local production versus imports in aggregate food availability and access, including the geographic distribution of production and consumption, and key actors in the marketing chain.
  - **Market behavior/conduct**, including purchase or selling behavior of key actors present in the marketing chain.

- **Market performance outcomes**, including production trends, inter- and intra-annual price variability, and regional or international competitiveness.
- **Key indicators** that analysts need to monitor over the course of the marketing year that could affect food availability and access of the poor and very poor.
- FEWS NET's widely recognized production and trade flow maps are incorporated into the report for commodities produced and consumed both locally and regionally as a means of illustrating the relative importance of certain markets and trade flow patterns in assuring food availability and access throughout the country. However, when a commodity is grown almost entirely as an exported cash crop or imported almost exclusively from international markets, other relevant diagrams and illustrations are used.

## Key Concepts

The following provides the definitions of several key terms used throughout the report. For more detail on these definitions and other useful terms, consult the [FEWS NET Markets and Trade Glossary](#).

**Marketing system:** This includes the entire commodity distribution system from production to consumption. A marketing system describes the key actors and the linkages between different stages of the distribution process of a given commodity. The marketing system also describes the spatial and functional relationships between market actors.

**Marketing year:** This refers to the period during which agricultural production from a given year's harvest is sold. This period typically extends from one harvest of a particular commodity to the next, and is very similar to the consumption year used in FEWS NET's livelihoods work in many cases.

**Unimodal areas:** Unimodal areas are agro-ecological zones with one distinct rainy season with one rainfall peak and typically a single harvest.

**Bimodal areas:** Bimodal areas are agro-ecological zones with either a single prolonged rainy season with two rainfall peaks or two or more distinct rainy seasons (which could each be unimodal or bimodal), resulting in two or more harvests. The amount of rainfall can be equivalent between rainy seasons or one may be dominant (for all commodities or for a single crop), resulting in differing yields between seasons.

**Commodity-specific classifications of surplus and deficit areas are established based on historical production figures and on FEWS NET staff and key informants' knowledge of the consumption patterns of particular areas of a given country.** When surplus and deficit areas are identified in aggregate, the determination is typically based on total local production, expressed in kilocalorie terms, compared to total local needs (also expressed in kilocalorie terms). Estimated staple food needs are typically established by local governments and updated as consumption patterns change.

**Surplus-producing area:** A geographic area that produces sufficient quantity of a given commodity (or set of commodities, like cereals) to cover local demand and to supply other areas. An area can likewise be defined as either having a minor surplus, meaning that in a normal year slightly more of a commodity is produced than required to meet local needs, or as having a major surplus, meaning that production in a given area largely surpasses local needs.

**Deficit area:** A geographic area that does not produce enough of a given commodity to meet local demand.

**Self-sufficient area:** A geographic area that produces sufficient quantity of a commodity to cover local demand. This area rarely produces: (1) enough to either supply other areas; or (2) too little to meet local needs.

### *Market types*

**Reference market:** A market that provides information about supply, demand, and price conditions in other nearby markets or key markets that influence the performance of others.

**Collection market:** A rural market where relatively smaller-scale traders (or trader agents) purchase directly from producers.

**Assembly market:** A market where relatively smaller quantities of a commodity are accumulated or aggregated, usually from different farmers and small-scale traders.

**Wholesale market:** A market where traders generally sell to traders. The volumes traded in each transaction tend to be relatively larger (for example, multiple 50-kg bags and even metric tons).

**Retail market:** A market where commodities are sold directly to consumers. The volumes traded during each transaction tend to be relatively small (for example, per kg or locally used bowl or other unit of measure).

#### *Formal versus informal trade flows*

**Formal trade flows:** Formal trade flows typically involve the exchange of large quantities of a given commodity, transported by road, rail, or sea. These trade flows are inspected, taxed, and reported in official government statistics, and abide by the requirements of the local legal system (including national-level laws and regional trade agreements). For example, in some countries, an importer or exporter is required to obtain a license from the local government or regional trade body that gives authority to engage in import or export activities. Formal trade can often also be thought of as legal trade.

**Informal trade flows:** Informal trade flows typically occur outside of the formal trade system (described above). These exchanges are typically not recorded in official government import and export statistics and are not inspected and taxed through official channels. These trade flows are typically undocumented, unlicensed, and unregistered. Informal trade flows can vary from very small quantities carried by bicycle across small border crossing areas or via barge in large volumes exchanged over long distances.

#### *Trade flow magnitude and frequency*

**Large trade flows:** The volumes traded (through either formal or informal channels) are estimated to be (in qualitative terms) more important than other trade flow volumes in aggregate terms over the period of analysis. In unimodal FEWS NET countries, this represents the relative importance of trade flows between different geographic areas over a given marketing year. In bimodal areas, these may be season-specific. Because it is not possible to estimate actual trade flow volumes between markets in most FEWS NET countries, these are estimated based on discussions with key informants familiar with the staple food market system of a given country or region.

**Medium trade flows:** The volumes traded (through either formal or informal channels) are estimated to be (in qualitative terms) somewhere in between large and small flows in terms of the aggregate volumes traded over the period of analysis. These are estimated through the same process as large trade flows (above).

**Small trade flows:** The volumes traded (through either formal or informal channels) are estimated to be (in qualitative terms) less important than other trade flow volumes in aggregate terms over the period of analysis. These are estimated through the same process as large trade flows (above).

**Occasional trade flows:** These trade flows either take place during very specific times of year (for example, in the lean season only) or when certain specific conditions present themselves. These are typically not as important (in aggregate quantity) as other more regular types of trade flows.

#### *Price analysis*

**Coefficient of variation:** One of many measures of price variability, this is computed by dividing the standard deviation of a given price series by the mean.

**Average seasonal index:** This is calculated to demonstrate the extent to which prices during a given month in a given place differ, on average, compared to prices during other months of the year.

**Free on board (FOB):** This term is the market value of goods at the point of uniform valuation (the customs frontier of the economy from which they are exported).

**Cost insurance freight:** This is the price of a good delivered at the frontier of the importing country, including any insurance and freight charges incurred to that point, and before the payment of any import duties or taxes.

## 1. Sudan Staple Food Market Fundamentals

### 1.1 Introduction

**Sorghum, wheat, and millet are the three main staple foods produced, consumed, and traded in Sudan (FSTS 2014).** At a national level (Table 1), Sudan is structurally deficit in overall staple food availability during an average year, but net trade flows vary considerably by commodity and by locality within the country. Multiple staple food production systems are present in the country: traditional rainfed, semi-mechanized, and irrigated (Table 2). Local grain production varies considerably from year to year, with interannual variation driven largely by rainfall patterns. Other cross-cutting factors like conflict, opaque government policies that directly affect food availability and access (for example, input subsidies, agricultural credit programs, and trade policies), long-standing economic sanctions, food aid flows, and the availability and cost of inputs also affect production patterns, the movement of grain from surplus to deficit areas of the country, and imports from international markets, with implications for both food availability and access. The effects of these issues are felt in both structurally surplus and structurally deficit areas of Sudan.

### 1.2 National food supply

**The poor and very poor rely on food purchases to meet their staple food needs throughout Sudan during normal years.** However, the degree of market dependence (estimated by the number of months market purchases are made) varies widely by livelihood zone in Sudan (Table 3). For example, in the more arid and sparsely populated pastoral areas, households are 100 percent market dependent for grains throughout the year. However, for populations living in the highly productive areas of southeastern Sudan, households depend on markets for less than half of the year. Household-level market dependence increases during years of poor production, although the quantities of grain purchased are determined by household purchasing power.

**Table 1 Sudan commodity balance sheet (000s MT), 2009/10-2013/14**

Element	All cereals	Sorghum	Millet	Maize	Wheat	Rice
<b>Commodity availability</b>						
Total local availability (000s MT)	4,587	3,285	595	39	643	25
Opening stocks	490	173	12	0	305	0
Production	4,097	3,112	584	39	338	25
Commercial imports	1,664	0	0	0	1,615	49
<b>Commodity utilization</b>						
Total utilization	<b>6,000</b>	<b>3,355</b>	<b>607</b>	<b>45</b>	<b>1,919</b>	<b>73</b>
Food	5,151	2,645	528	36	1,871	70
Feed and seed	391	316	46	6	21	2
Post-harvest losses	350	286	32	4	27	1
Export	108	108	0	0	0	0
<b>Import gap</b>						
Import requirements	<b>1,342</b>	<b>0</b>	<b>12</b>	<b>6</b>	<b>1,276</b>	<b>48</b>

Source: FEWS NET estimates based on 2009/10- 2013/14 ACFSAM reports and complementary information from the Ministry of Agriculture and Irrigation Food Security Technical Secretariat (FSTS), the Strategic Reserve Corporation (SRC), Bank of Sudan, and other key informants.

Note: The average quantities cited in this table do not include informal trade estimates or in-kind food aid.

The traditional rainfed, semi-mechanized, and irrigated production systems each contribute, on average, to approximately one-third of overall domestic cereal production in Sudan. Sorghum and millet harvests typically take place from November through January, while irrigated wheat harvests reach their peak in March. The eastern States of Gezira (85 percent irrigated and 15 percent traditional), Gedaref (nearly all semi-mechanized), and Sennar (two-thirds semi-mechanized) are

the most productive in terms of overall cereals production. Average historical production volumes indicate that states in south central (South Kordofan State) and western (West and South Darfur States) Sudan make important contributions to overall food availability. However, this trend has changed in recent years and subsequent years of civil unrest have particularly disrupted the traditional rainfed production systems that represent 66 percent of grain production in South Kordofan and nearly all agricultural production in West and South Darfur States (FSTS 2014).<sup>3, 4</sup> Although some irrigated and rainfed production occurs in Northern and River Nile States, those sparsely populated areas of the country are structurally deficit in staple foods, with a strong preference for wheat, but they produce sufficient local sorghum and wheat to meet their local needs. Despite investments and advances in production technologies (including water management), agricultural production in Sudan remains heavily influenced by annual rainfall variability (Sassi and Cardaci 2013).

In aggregate terms, Sudan is structurally deficit in cereals during an average year, and relies heavily and increasingly on wheat imports from international markets to meet domestic food needs (Table 1). Sudan is structurally surplus in sorghum, self-sufficient in millet, and structurally deficit in wheat (Table 1). Imports of wheat (for human consumption) and maize (for poultry and ruminant consumption) from

**Table 2 Average cereal production (000s MT) by sector, 2008/09-2012/13**

Sector	Total cereals	Sorghum	Millet	Wheat
Irrigated	1,223	845	4	374
Mechanized	1,422	1,366	56	0
Traditional	1,546	991	543	12
Total Sudan	4,189	3,201	603	385

Source: FSTS 2014.

**Table 3 Months of market dependence for sorghum and wheat by poor rural households in Sudan, by Livelihood Zone<sup>1</sup>**

Livelihood Zone <sup>2</sup>	Sorghum	Wheat (Bread)
	(# of months)	
Northern Riverine Small-scale Cultivation Zone (SD01)	3	3
Southern Riverine Small/Medium-scale Cultivation Zone (SD02)	8	8
Eastern Pastoral Zone (SD03)	12	N/A
Eastern Khors Agropastoral Zone (SD05)	6-7	12
Coastal Fishing Zone (SD06)	12	12
Eastern Agropastoral Sorghum Zone (SD07)	6	N/A
Flood-retreat Cultivation Zone (SD08)	9	12
Central Irrigated Schemes (SD09)	5	12
Southeast Rainfed Semi-mechanized Agriculture (SD10)	5-6	12

Source: FEWS NET.

<sup>1</sup> The livelihoods profiling done in Sudan by FEWS NET in 2014 covers 9 of the 19 livelihoods zones identified.

<sup>2</sup> Sorghum and wheat (bread) were the two predominant staple foods identified in recent profiling work. Other staple foods retained include okra and milk. The recent work did not include the main millet-consuming areas of the country. Table 4 is therefore incomplete in that regard.

<sup>3</sup> These numbers refer to five-year average production levels (FSTS 2014).

<sup>4</sup> This subject will be covered in the "cross-cutting issues" section of the report, as in some areas of the country, it has had persistent impacts on nearly all aspects of economic activities.



international markets rather than regional markets fill the food gap during years of poor production (for example, 2011/12 and 2013/14), a phenomenon that relies heavily on government and donor financial support. Wheat is also imported into Sudan via in-kind international relief efforts, but those volumes are very limited compared to commercial and government import volumes. Imports arrive through Port Sudan year-round. Imports of nearly all products are largely destined for Khartoum before being distributed via commercial channels throughout the country.

### 1.3 National food demand

**The country's largest consumption center is Khartoum, where approximately one-fourth of the country's 36 million inhabitants live** (Table 4). Aside from limited production volumes in Khartoum State, the urban population of Khartoum is almost entirely market-dependent to meet its food needs. Sudan's rapid rate of urbanization is driven by persistent civil strife in areas such as the Darfur, South Kordofan, and Blue Nile States over the past ten years, coupled with successive years of drought. This includes the famine of 1984, which drove millions of people from their areas of origin toward the country's urban centers.

Established urban populations continue to consume local cereals, but rely increasingly on substitute wheat-based breads and pastas. These trends are consistent with urban consumption patterns in other parts of Africa south of the Sahara (McKee 2010; Youngblood et al. 1983). Furthermore, anecdotal evidence suggests that within a few years of displacement from rural areas to urban centers (including Khartoum, Wad Madani, and Kosti, among others), up to 90 percent of newly displaced populations substitute away from sorghum and millet as the primary staple foods to wheat-based bread. This has resulted in the concentration of national grain storage, processing, and consumption in some key urban areas and driven increased national dependence on wheat imports from international markets, as domestic production is unable to satisfy demand.

**Other structurally deficit areas of the country include North and South Darfur States in western Sudan.** Until as recently as ten years ago, the majority of the Darfur States were self-sufficient in terms of staple food production. Prolonged periods of conflict (discussed below) has severely disrupted local

production patterns and food aid have played an increasingly important role in assuring that populations meet their staple food needs (Buchanan-Smith and Fadul 2008; Buchanan-Smith and Jaspars 2007). In these areas

**Table 4 Average cereal deficit in Sudan (000s MT), by state**

State	Total cereal production (000s MT 5-yr avg.)	Total population (000s) a/	Total cereal requirement b/	Net surplus (000s MT)
Gedaref	667	1739	253.90	413.106
Sennar	374	1580	230.68	143.32
S Kordofan	360	1812	264.55	95.45
Gezira	696	4285	625.61	70.39
Wh Nile	349	2087	304.70	44.30
Blue Nile	152	966	141.04	10.96
Northern	129	814	118.84	10.16
W Kordofan	N/A	N/A	N/A	N/A
W Darfur	152	1530	223.38	-71.38
R Nile	101	1309	191.11	-90.11
Kassala	132	2134	311.56	-179.56
Red Sea	8	1367	199.58	-191.58
N Kordofan	221	3074	448.80	-227.80
N Darfur	97	2231	325.73	-228.73
S Darfur	442	4701	686.35	-244.35
Khartoum	20	6535	954.11	-934.11
<b>National</b>	<b>4,153</b>	<b>36,164</b>	<b>5278.00</b>	<b>-1,126.94</b>

Source: Adapted by FEWS NET from FSTS 2014.

a/ 2013 estimates.

b/ Estimates assume an annual grain requirement of 0.146 MT/per capita (FSTS., 2014), roughly equivalent to 1,400 kcal from grains per day.



(bordering Chad to the west and South Sudan to the south), millet is the strongly preferred staple food, followed by sorghum and wheat. Substitution across commodities is driven by relative prices, as well as the presence of relief commodities. These two states currently rely on trade flows from central and western Sudan, wheat imports from international markets, grain from neighboring Chad, and substantial volumes of in-kind food aid largely procured from international markets. In central Sudan, North Kordofan State is located in a low-potential area. The main market, El Obeid, plays an important role in supplying markets in both central Sudan and as a transit point for trade flows between eastern and western Sudan. The sparsely populated and low-production Northern State is nearly self-sufficient in staple foods, although wheat is the preferred commodity. The densely populated Kassala State is a key transit point for goods and people between Sudan and neighboring Eritrea. Staple food production there is insufficient to meet local needs, and supplies from neighboring Gedaref, Gezira, and Sennar States help fill remaining needs. Red Sea and River Nile States rely heavily on both domestic and international source markets to meet their staple food needs.

## 2. Cross-cutting Issues<sup>5</sup>

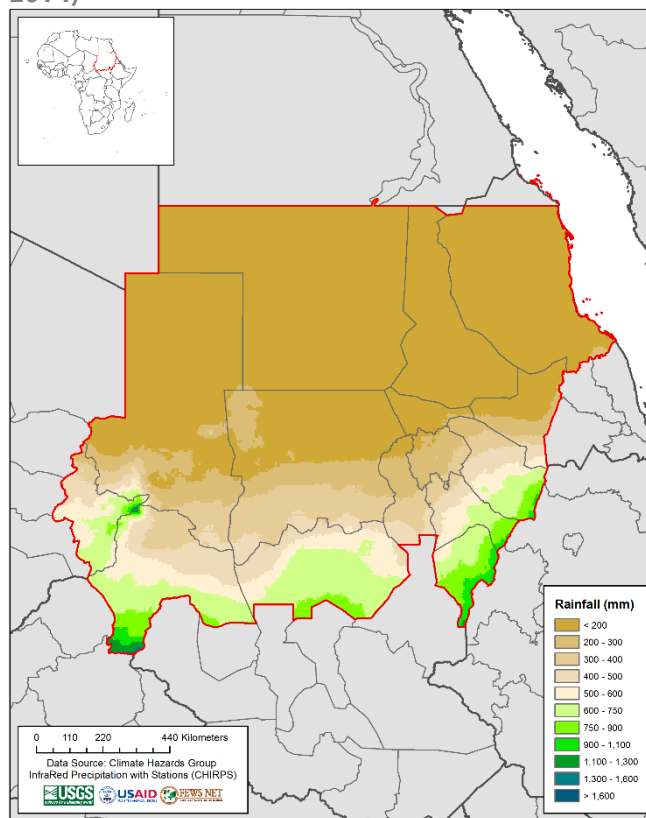
A number of ongoing and cross-cutting issues affect nearly all aspects of the Sudanese economy, including staple food marketing systems. Highly variable agroclimatic conditions, prolonged periods of conflict, and macroeconomic instability are three of the most prominent issues affecting staple food availability and access in Sudan. In the event that the impacts of some of the issues highlighted here differ somewhat by commodity, they will be discussed anew and in more detail in the commodity-specific sections below.

### 2.1 Agroclimatology

**Large differences in rainfall and ecology exist across Sudan.** Although several parallel grain production systems (rainfed traditional, rainfed semi-mechanized, and irrigated) apply varying production technologies, rainfall levels and rainfall variability continue to have a pronounced effect on grain production and marketing in Sudan (Figure 4). This appears to be most pronounced for millet (which is overwhelmingly grown under traditional rainfed systems), but the other production systems are not immune (Table 5). Sudan has unimodal rains from July to October. The November to June dry season includes two subseasons: the first from November to February/March, typically characterized by cooler temperatures, and the second, from March to June, when temperatures are hotter. Varied rainfall patterns and climatic conditions across the country provide a range of production systems in Sudan, resulting in varying agro-ecological zones.

**Rainfall patterns vary considerably, from almost little to no rainfall in semi-desert areas to up to 1,000 millimeters (mm) in Blue Nile State.** Generally, southern parts of the country receive the most rain and rainfall amounts progressively decrease moving north. Gedaref, Sennar, Blue Nile, White Nile, and parts of South Kordofan States, including the majority of the Nuba Mountains area, receive between 400 and 900 mm of rainfall annually. Rains start earlier further south in mid-June, with twice as much rainfall and less variability as northern areas of these states. Most parts of South Darfur State receive 250-350 mm of rainfall per year, although

**Figure 4 Average rainfall levels in Sudan (2000-2014)**



Source: FEWS NET.

**Table 5 Coefficient of variation of cereals production, 2000-2013**

Production scheme	Total cereals	Sorghum	Millet	Wheat
Irrigated	0.23	0.21	N/A	0.34
Rainfed	0.31	0.33	0.28	N/A
Total Sudan	0.25	0.28	0.28	0.33

Source: FEWS NET calculations using Ministry of Agriculture data.

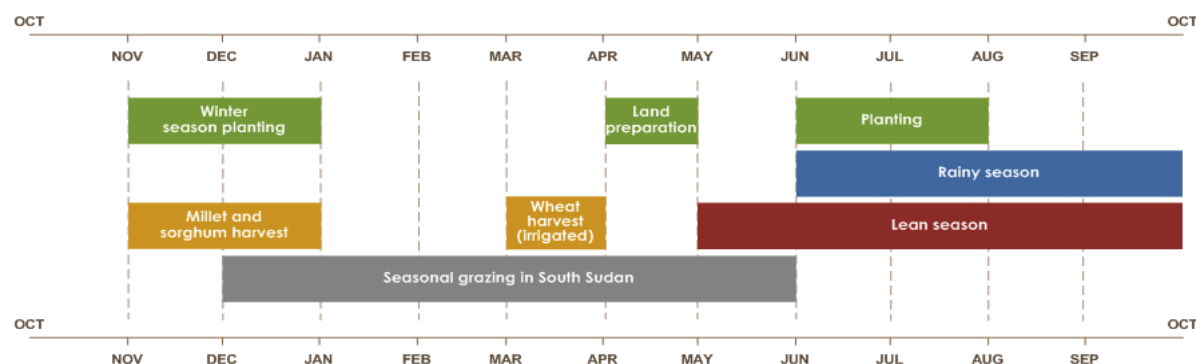
<sup>5</sup> The content in this section was heavily influenced by the ongoing work by Tufts University on the impacts of conflict and food aid on grain markets in the Darfur States (Krystalli 2014).

rains are typically erratic. Mean annual rainfall in West and North Darfur and North Kordofan States is less than 300 mm, with erratic rainfall and frequent dry spells or drought. Delayed onset of rains is common in the Darfur States. Kassala, Gedaref, and Western Jazeera States have mean annual rainfall of 230-240 mm. In areas northeast of Khartoum in Red Sea and River Nile States, maximum rainfall is less than 150 mm on average. Little to no rain falls in the northern desert areas of Red Sea and Northern States, where total cumulative annual rainfall is 0-50 mm.

**Rainfall across the country is unreliable, with large variations between years.** Rainfall in some areas may vary by up to 30 percent compared to average (above or below) in a given year. Late onset of rains delays green harvests and reduces the time for crops to reach full maturity. September is the main flowering and heading period for sorghum, and erratic rains during this period can result in developmental delays and yield reductions. Flooding occurs in the extreme south and along the Blue Nile and White Nile Rivers. Flood risk is typically highest from August to October.

**Although important advances have been made in agricultural production technology (including widespread use of irrigation and semi-mechanized production), annual rainfall patterns continue to play an important role in determining annual agricultural output.** This has important implications for annual market supplies of locally produced grains, including sorghum, wheat, and millet.

**Figure 5 Seasonal calendar for Sudan**



Source: FEWS NET.

## 2.2 Storage

The bulk of Sudan's grain storage capacity is concentrated in the nation's high-productivity zones (particularly the eastern and central White Nile, Blue Nile, Gedaref, Gezira, and Sennar States), in the greater Khartoum area (the nation's largest consumption zone, as discussed in the previous paragraph), and in Red Sea State, where wheat grain imports arrive from international markets (FSTS 2011). The rest of grain storage takes place at the trader, farm, and household levels throughout the country. The capacity for large-scale storage is much more limited in the deficit areas of the country and in conflict-affected areas (that is, Darfur States and South Kordofan). Storing large quantities of grain in conflict-affected areas over long periods is a risky activity. In those areas, grain storage is therefore limited to small-scale on-farm and household storage and a limited number of temporary storage facilities. Since 2010, there have been some reports of traders from deficit areas making very large purchases at relatively lower prices during the immediate post-harvest period and storing them in storage facilities in the source market or in intermediate areas like Khartoum until market demand begins increasing. The national

Strategic Reserve Corporation (SRC) likewise stores grains for both domestic sales and distribution and export (as discussed in subsequent sections).<sup>6</sup> During a typical year, the majority of those stocks are held in the surplus-producing areas (over 90 percent) and the remaining stocks are held in Kordofan and Darfur States, although the specific quantities vary considerably from year to year (FSTS 2011; FSTS 2014).

*The “Salam” system is an Islamic economic arrangement whereby the creditor provides cash to a farmer to help finance certain activities at the beginning of the season and will typically be repaid in-kind during the harvest or post-harvest period.*

## 2.3 Agricultural financing

**The Agricultural Bank of Sudan (ABS) and its SRC play important roles in financing agricultural production and marketing, although the bulk of their activities are concentrated in the surplus-producing zones in the eastern part of the country and the large majority of input credits and grain reserve sales involve commercial-scale mechanized and semi-mechanized farmers, rather than those involved in the traditional sector.** In 2012, 77 percent of financing provided by the ABS went to the three largest producing states, while 87 percent of financing went to those same states in 2013. In simplified terms, the ABS mainly provides credits for the purchase of inputs and machinery used for sorghum and wheat production in the irrigated and semi-mechanized sectors ahead of the growing season (starting in June for sorghum and November for wheat; Figure 5).<sup>7</sup> Growers can repay loans to the ABS in cash or in kind during the post-harvest period under the “Salam” system, one of many loan and credit arrangements that exist in Sudan (Mohammed and Hussein 2012). Commercial banks also provide some loans to farmers, but the ABS is the leader, nationally. When loans are repaid in kind, those stocks are made available to the SRC for local distribution, subsidized sales, or other domestic activities, or to sell to foreign buyers (mostly Gulf States) in exchange for hard currency. Although the SRC does purchase some grain directly outside of these credit arrangements, this is the main mechanism through which it replenishes its stocks each year. That hard currency is then made available for use by the government to finance other expenditures, such as supporting wheat imports from international markets or other government expenses. External assistance (most recently from Gulf States) plays an important role in assuring funds to the SRC for grain procurement internationally during years of very poor harvest.

## 2.4 Conflict

**Prolonged periods of conflict in the South Kordofan, Blue Nile, and Darfur States have influenced staple food marketing systems in Sudan in a number of interrelated ways:**

**First, it has generally been observed that conflict negatively affects grain production in either the short or long term in affected areas by destruction of agricultural land, disruption to agricultural activities (for example, planting, weeding, and harvesting), and displacement of populations (Krystalli 2014).** FEWS NET believes that these impacts have been greatest in traditional rainfed areas, where landholdings are smaller and in closer proximity to concentrated populations (such as villages and towns in South Kordofan and Blue Nile States). Semi-mechanized production schemes, on other hand, tend to be more geographically remote, and therefore less exposed to conflict-related disruptions. However, in the semi-mechanized production areas of South Kordofan

<sup>6</sup> The SRC is a department within the Agricultural Bank of Sudan (ABS).

<sup>7</sup> The micro-credit scheme is also available in a more limited way to millet producers, who generally use much less inputs and machinery than other types of producers. Cash crops (groundnut and sesame producers) also rely on this type of credit scheme, particularly in the country's more intensive production zones.

State, many large-scale farmers have been reluctant to use their equipment (for example, tractors) out of fear of looting and destruction by rebels.

**Second, prolonged periods of conflict (since the 1980s in some areas) have driven large numbers of individuals**

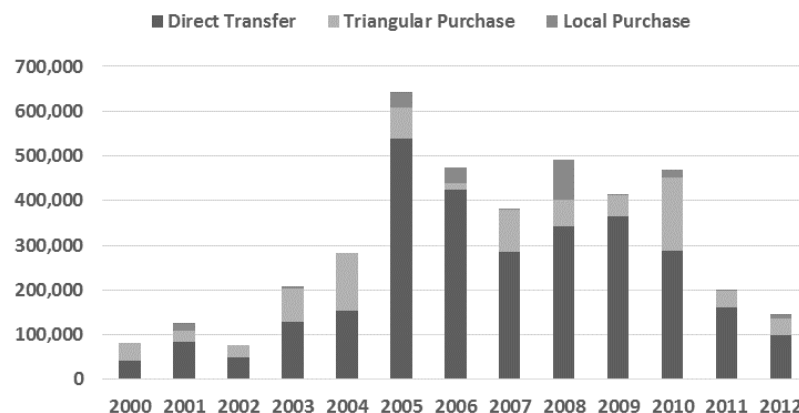
**and families from their areas of origin, resulting in more concentrated populations in the country's major urban centers and towns, especially Khartoum.** Although this general process of urbanization was likely inevitable, given similar trends

observed throughout northern Africa and Africa south of the Sahara, FEWS NET believes the process was sped up as people were driven from their homes. As has been observed elsewhere, with urbanization generally comes shifting consumption habits, including a preference for easier-to-prepare and ready-made foods (including bread).

**Third, prolonged periods of conflict are believed to have severely disrupted trade flows between the areas of the country and the Darfur States (Dorosh and Subran 2009).** As can be seen in the Production and Trade Flow maps included in this report (Figures 12, 18, and 21), there is a reduced trend of grain trade flows between central (and eastern) Sudan and the westernmost states. High transport and transaction costs (due to insecurity) have resulted in the GoS being required to provide security to large traders who wish to travel along the roads linking El Obeid Market to El Fasher and Nyala Markets.<sup>8</sup>

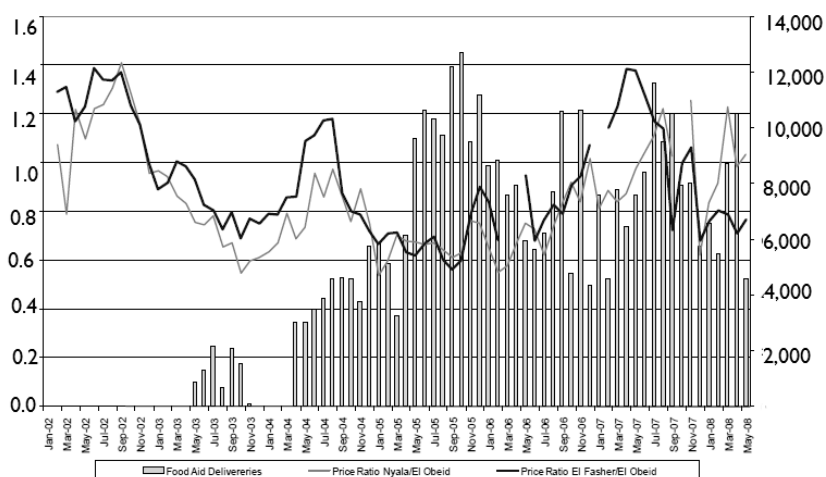
**Fourth, protracted conflict and large numbers of internally displaced populations have been accompanied by various emergency food assistance programs aimed at improving food availability and access for targeted populations.** In aggregate terms, in-kind food assistance plays a fairly minor role in total food availability in Sudan, although the quantities of in-kind food assistance vary considerably from year to year (Figures 6 and 7). For example, in 2012, total food aid delivery tonnage was equivalent to 200,000 MT, including approximately 150,000 MT of wheat and sorghum, corresponding to less than 5 percent of aggregate staple food availability that

**Figure 6 In-kind wheat and sorghum assistance, 2000-2012**



Source: WFP/INTERFAIS ([www.wfp.org/fais](http://www.wfp.org/fais)).

**Figure 7 Sorghum price ratios and in-kind food aid deliveries**



Source: Dorosh and Subran 2009.

<sup>8</sup> Anecdotal evidence indicates that if a trader is not able to participate in the convoy, he may find himself in one of the country's more remote towns for up to one month as he waits for localized insecurity to subside.

year. In 2005 on the other hand, over 900,000 MT of in-kind assistance deliveries were distributed in Sudan, including over 600,000 MT of wheat and sorghum, corresponding to less than 15 percent of aggregate food availability. However, these quantities are largely destined for fairly constrained geographic areas with large numbers of displaced populations, including the Darfur States and part of Kassala State, and so local impacts of food aid and assistance markets can be much more pronounced.

## 2.5 Food aid

**Large inflows of food aid into conflict-affected areas are believed to have helped offset the effects of local production shortfalls and limited commercial trade flows into the Darfur States, which have been found to be relatively more isolated from the national market system (see the commodity-specific trade flow discussions below).** For example, in 2012, total food aid delivery tonnage was equivalent to 200,000 MT, including approximately 150,000 MT of wheat and sorghum (Dorosh and Subran 2009). According to several accounts, in 2005, the availability of food aid commodities helped to sustain private traders at a time when they were unable to procure grain through their standard marketing channels due to severe local production shortfalls and conflict-related insecurity. This means that particularly during years of very poor local grain production, in-kind assistance has helped to improve local availability and has had multiplier effects throughout the economy by benefiting private traders who might otherwise have gone out of business. During such periods of large-scale distributions, prices in intervention zones have remained lower than elsewhere in the country and more stable in some instances (Dorosh and Subran 2009; Buchanan-Smith and Fadul 2008). With that said, humanitarian organizations have been forced at times to rethink their distribution strategies when food aid commodities are sold as far away as Khartoum (Dorosh and Subran 2009).

**Most recently, there has been a push to focus more on cash and voucher programs by humanitarian organizations.** These programs can indeed have positive impacts on markets if they are designed well and if the marketing system context allows for it. However, in 2013 and 2014, a year of well-below-average production throughout Sudan, such measures are believed to have aggravated marketing systems in intervention areas by increasing effective demand at a time when market supplies in both the Darfur States and elsewhere in Sudan were atypically low (FEWS NET 2014). This resulted in particularly high and volatile prices in intervention zones, and ongoing cash and voucher programs in a year with very serious food availability constraints are believed to have been a contributing factor (Table 6). Additional research is needed to understand how these programs affected markets in 2013/14 and how their design might be improved in future years.

**Table 6 Price variability in 2013/14 versus 2012/13 (coefficient of variation; Nov-May prices) <sup>9</sup>**

State	2012/13	2013/14
<b>Darfur States</b>		
Geneina (sorghum)	0.07	0.26
Geneina (millet)	0.03	0.15
Nyala (sorghum)	0.07	0.21
Nyala (millet)	0.04	0.16
<b>Central and Eastern Sudan</b>		
El Obeid (sorghum)	0.06	0.12
Gedaref (sorghum)	0.05	0.17
Khartoum (sorghum)	0.03	0.19

Source: FEWS NET.

Note: These figures compare price variation in 2012/13, a year of very good agricultural production, to that of 2013/14, when production was well below average and cash and voucher programs were used increasingly in the Darfur States.

<sup>9</sup> The coefficient of variation is one of many measures of price variability.



## 2.6 Macroeconomy

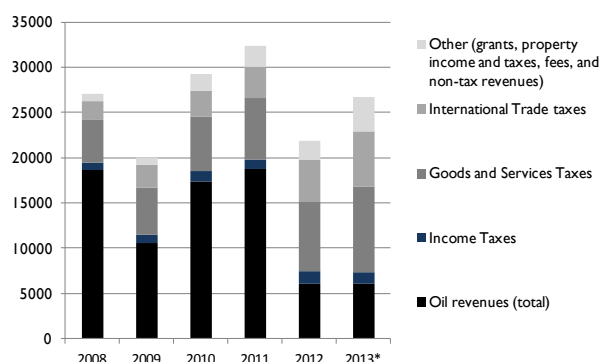
In addition to the impacts of protracted conflict and variable agroclimatic conditions, as outlined above, several aspects of the general macroeconomy influence aggregate as well as commodity-specific food availability and access, including price levels and variability. Substantial reductions in revenues from oil exports since South Sudan's independence in 2011 have had a ripple effect through the economy. At that time, Sudan closed the border with South Sudan, followed by significant reductions in oil output in South Sudan. In 2011, Sudan lost access to more than three-quarters of its oil reserves (Figure 8). These reserves constituted 75 percent of the country's exports, were the main source of hard currency inflows, and were the main driver of the economic

boom that lasted from 2001 to 2011 (IMF 2013). Sudan continues to earn some income from exports that transit through Port Sudan through a cost-sharing arrangement with the South Sudanese government, but at very low levels given the low levels of output in South Sudan (Figure 8). Over the past three years, the government has struggled to acquire sufficient foreign exchange and revenues as the value of the Sudanese pound declined on both the official and black market and as inflation soared (Figure 9). Oil exports from South Sudan have still not recovered, which continues to restrict incomes for both economies.

### 2.6.1 Impact of the depreciating Sudanese pound

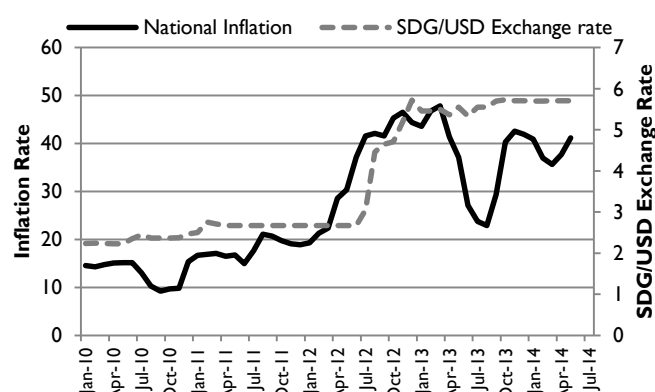
The depreciation of the Sudanese pound (SDG) over 2012 and 2013 is believed to have made it increasingly difficult to obtain food, medicine, and agricultural inputs sourced from international markets. Indeed, the Sudanese government is believed to have used the national sorghum market (via exports through private traders) as an opportunity to generate export earnings and, to a lesser extent, the country's SRC in an effort to generate foreign exchange reserves (to compensate for the loss of oil revenues), which are necessary to import essential goods for the people of Sudan. This includes, but is not limited to, wheat imports. With the intervention of the SRC, sorghum is exported to countries such as the Gulf States even during years of very high prices that are generally uncompetitive internationally. This liquidation of local grain stocks to finance other activities has also limited the country's overall ability to smooth national-level local grain availability on an interannual basis, resulting in situations like those of 2011/12 and 2013/14, when both production and opening stocks were very low during the year, following a bumper harvest.

**Figure 8 Contributions to the GoS budget (millions of SDG)**



Source: IMF 2012; IMF 2013

**Figure 9 Sudanese macroeconomic indicators, 2010-2013**



Source: Sudan Ministry of Finance.

Two of the country's main staple food markets (sorghum and wheat) have the potential to be heavily impacted by other opaque and unpredictable policies and expenditure patterns.

### 2.6.2 Economic sanctions

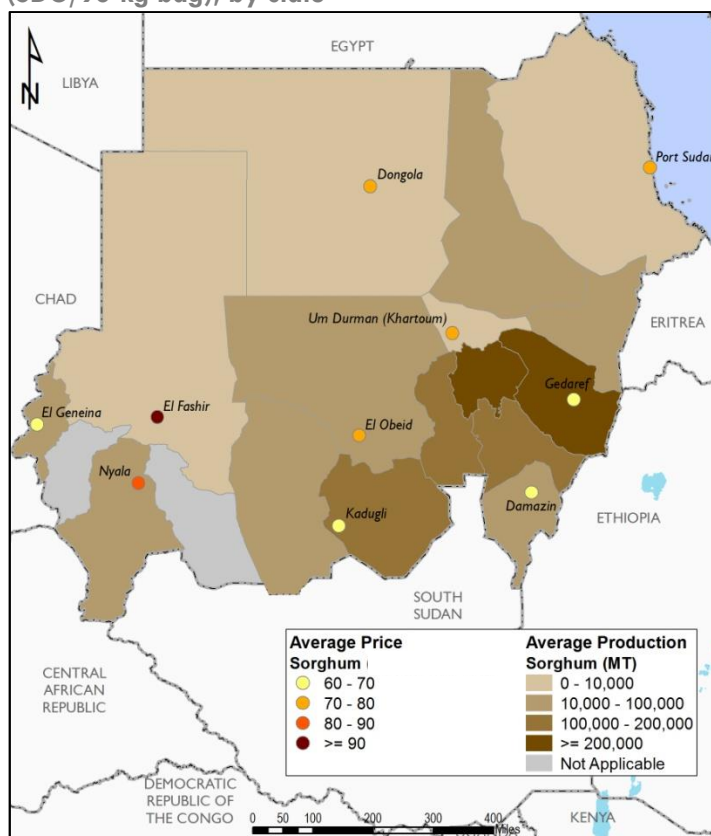
**Economic sanctions in place since 1997 have limited the number of suppliers of staple foods and other essential goods (medicines and medical equipment as well as agricultural inputs and agricultural machinery) who source internationally.** This is because of difficulties associated with carrying out bank transactions between Sudan and other countries (they often must go through a third, neutral country). Only a small number of firms have the ability (financial and logistical) to engage in such expensive and complicated transactions. Together, these issues make for a very difficult environment within which to engage in economic activities that directly and indirectly affect the availability and accessibility of staple foods for the poor and very poor.



### 3. Sorghum

Sorghum is the most important staple food produced and consumed in Sudan and accounts for over 50 percent of total availability (Table 1). Sorghum plays a central role in Sudanese diets and is an important source of foreign exchange from exports to regional markets and the Gulf States. Nearly 45 percent of sorghum is produced in the semi-mechanized, rainfed sector, 25 percent in the irrigated sector, and 30 percent in the traditional rainfed sector. The sorghum surplus-producing states of Sudan are Gedaref, Sennar, Kassala, Blue Nile, and White Nile States in the center/east and South Kordofan and West Darfur States in the west (Figures 10 and 12). Sorghum is important for human and livestock consumption, although human consumption is lower in the western part of the country compared to central and eastern Sudan, where households generally prefer millet. Conflict has affected production and marketing systems in South Darfur and South Kordofan States. Historically, South Kordofan State was among the surplus-producing areas of Sudan for both sorghum and millet. However, production has decreased in recent years due to the impact of continued conflict, which has displaced populations, destroyed fields, and made traditional production in particular a risky activity. Nearly 40 percent of sorghum production in South Kordofan State is semi-mechanized and more geographically remote, which leaves farmers less vulnerable to impacts on production caused by conflict.<sup>10</sup> This is in contrast to South Darfur State, where landholdings are generally smaller and closer to major villages and towns and nearly 100 percent of grain is produced under traditional rainfed production systems, and therefore more exposed to the long-term negative impacts of conflict.

**Figure 10 Average sorghum production (MT) and prices (SDG/90-kg bag), by state**



Source: Compiled by FEWS NET from FAMIS and FSTS data.

Note: Average prices presented are four-year average prices (2010-2013) expressed in real 2007=100 prices). Average production levels presented are ten-year average production levels (2003/04-2012/13).

#### 3.1 Key actors in Sudan's sorghum markets

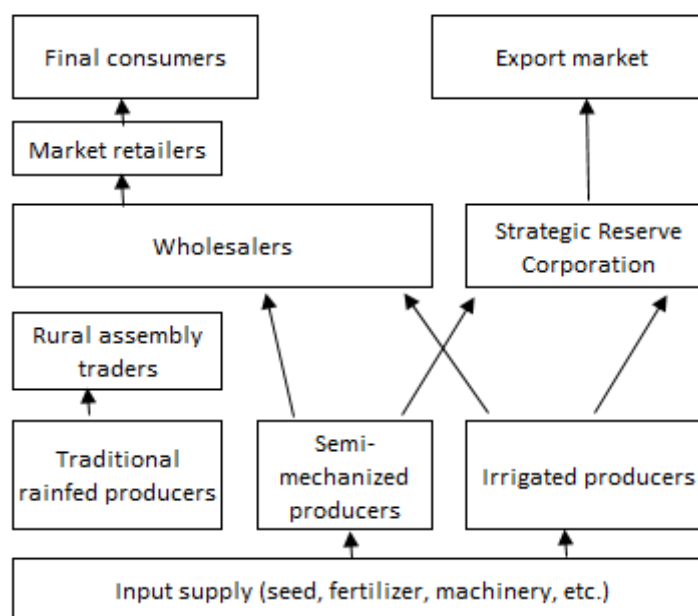
Several key actors play a role in the Sudanese sorghum marketing system, starting at the producer level (Figure 11). Sorghum producers vary from small-scale producers in the traditional rainfed production systems to large-scale producers in the country's high-productivity irrigated and semi-mechanized rainfed areas. Large-scale producers are also engaged in marketing through storage and trading activities (buying from smaller neighboring producers), particularly in the country's most productive areas. The ABS extends loans for inputs and machinery

<sup>10</sup> The contribution of the semi-mechanized sector to total agricultural production in South Kordofan is, on average, 37 percent. However, during the past two years, the contribution has been closer to 50 percent due to reductions in traditional rain fed agricultural production, particularly in the Nuba Mountains.

ahead of the marketing year to be paid back in cash or in kind (delivery to the SRC). Otherwise, traditional credit arrangements are established throughout the country and reflect the particularities of local customs and norms.

Producers typically sell their sorghum to smaller-scale traders in rural collection markets during the post-harvest period. Those traders aggregate larger quantities at rural assembly or wholesale markets. Large-scale traders are then involved in long-distance transactions of large quantities of grain. The SRC obtains the majority of its grain through in-kind repayments to the ABS. It stores the grain in larger grain storage facilities in the county's surplus-producing areas and Khartoum (and to a lesser extent in areas of central and western Sudan), before either distributing or selling the sorghum at subsidized prices or exporting it as a means of obtaining valuable foreign exchange reserves. During years of above-average harvests, the SRC also intervenes on behalf of the government to buy sorghum at fixed prices to avoid sharp declines in sorghum prices during harvest and post-harvest periods.

Figure 11 Sudan's sorghum marketing channels



Source: FEWS NET.

### 3.2 Key sorghum trade markets

**The largest sorghum trade market (in terms of quantities traded) is Gedaref, in the heart of the surplus-producing Gedaref State (Figures 10 and 12) where the majority of production occurs in the semi-mechanized sector, accounting for just under half of total sorghum production.** The market of Um Durman (Khartoum) is the country's largest, overall, and is an important terminal and transit market for nearly all commodities bought and sold in Sudan (including sorghum). El Obeid, in North Kordofan State, plays a central role in sorghum trade between the surplus and wholesale markets of eastern Sudan and deficit areas of central and western Sudan. El Fasher, the largest market in North Darfur State, receives sorghum supplies from El Obeid and Um Durman, as well as neighboring areas such as Saraf Omra. Other important wholesale sorghum markets include Wad Medani (a key source market for Khartoum), Rabak and Kosti (neighboring towns in White Nile State), Sennar (Sennar State), and Nyala (South Darfur State).

### 3.3 Domestic trade flows

**The timing and level of trade flows depend on the specific location in the marketing system.** For example, trade flows between rural collection and assembly markets and wholesale markets are most active during the immediate pre- and post-harvest period between October and January. This is when producers sell off any remaining stocks from the previous year and begin selling off the current year's production. Although this is the period of the year when prices are typically lowest (Figure 11), the need for cash to pay off loans and the

availability of limited on-farm storage facilities typically drive producers to sell large quantities at this time of year, despite the relatively low prices. Trade flows then typically slow down a bit between the post-harvest period and the start of the lean season (between February and June). Long-distance trade flows between the large production zones in the eastern part of the country and the western and northern states are typically most important during the lean season months (June/July through September/October), when stocks in the deficit areas of the country have largely run out.

### 3.4 Regional and international trade flows

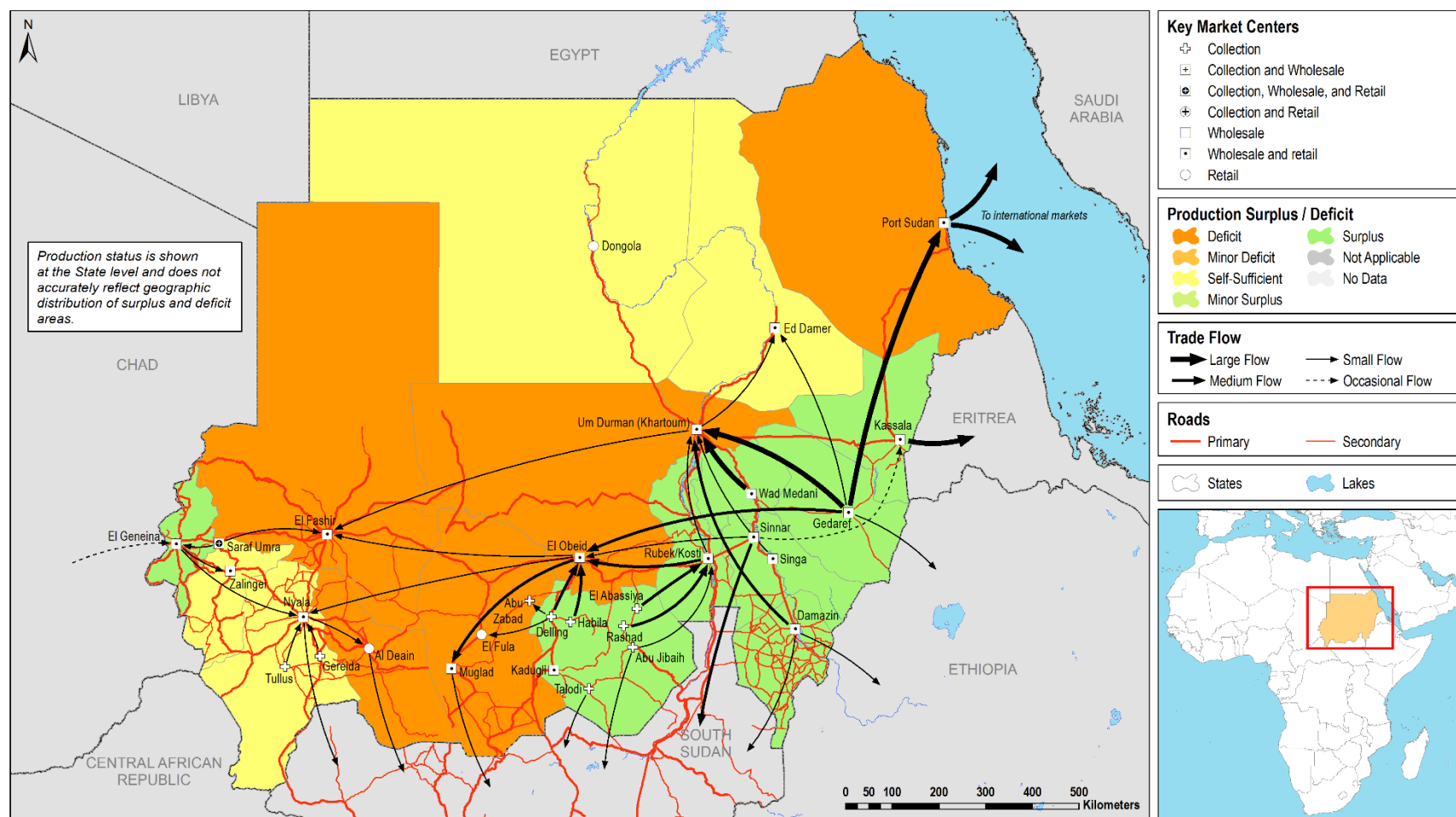
**Formal sorghum exports are largely destined for international markets and take place through the SRC and via Port Sudan (Figures 11 and 12).** Relatively smaller volumes of sorghum are exported to neighboring South Sudan and Ethiopia, also via arrangements with the SRC. Key informal cross-border trade points include Laffa and Hamadiyat in Kassala State, and Galabat and Kurmuk Gadarif, important wholesale market and transit points into neighboring Eritrea and Ethiopia, respectively. Sorghum exports to Ethiopia are quite limited and largely constrained to small-scale flows between populations on either side of the border. Trade flows from White Nile, Blue Nile, Kordofan, and Darfur States toward the states of southern Sudan were particularly important during the pre-2011 period. However, conflict and insecurity along the new Sudan-South Sudan border have disrupted trade flows between the two countries. Key wholesale markets and transit points for sorghum trade between the two countries include Ad Damazin, Kosti, Sennar, Nyala, and Ed Daein.

#### Gedaref Market Profile

- Gedaref Market, located in Gedaref State (eastern Sudan), is among the largest grain markets in Sudan.
- Trade in Gedaref Market is focused mostly on sorghum, but nearly all staple foods can be found, as well as cash crops and livestock.
- Sorghum from Gedaref supplies markets throughout Sudan as well as neighboring South Sudan, Ethiopia, and Eritrea. Most exports to Gulf States are sourced from Gedaref.
- The SRC, via repayment schemes of the ABS, procures most of its stocks from Gedaref, particularly during years of poor production.
- Storage capacity is estimated at hundreds of thousands of MT, and owned and managed by private traders, commercial banks, and the SRC.

Source: FARMERS/FSTS/FEWS NET.

Figure 12 Sudan sorghum production and trade flow map

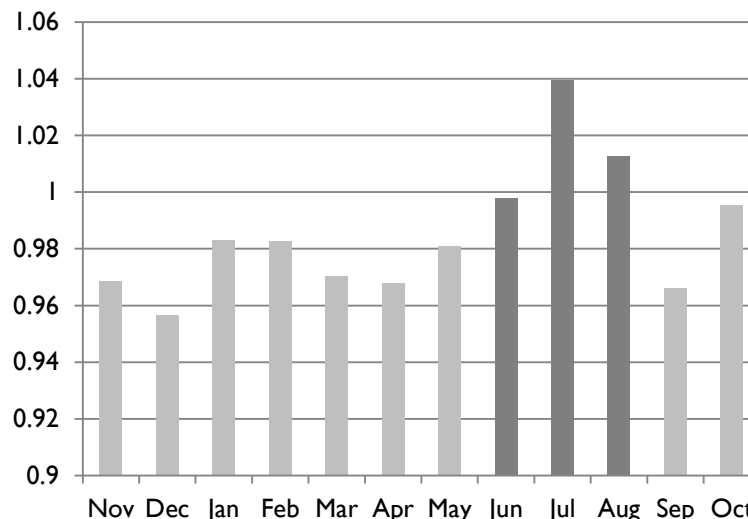


Source: FEWS NET Production and Trade Flow Maps provide a summary of the geography of marketing systems that are relevant to food security outcomes during an average marketing year or season. The maps are produced by FEWS NET in collaboration with stakeholders from local government ministries, market information systems, NGOs, and private sector partners, using a mix of qualitative and quantitative data (Annex 2).

**Occasional informal cross-border trade takes place between Sudan and Chad based on harvest prospects in both countries.**

However, it is more common for grain to move from border markets in Chad to border markets in Sudan. The most important border crossing points and markets are Um Dokhon, For Baranga, Beida Tendalti, and Selea markets in Central and West Darfur States. A considerable number of Sudanese farmers from border areas also cultivate in border areas of Chad, and return to Sudan to sell their goods. Occasionally, the authorities of Chad ban informal trade flow from Chad to Sudan following poor harvest (as in 2013/14). However, trade flows never come to a complete stop due to the strong social relationships between ethnic groups residing on both sides of the border.

**Figure 13 Average seasonal sorghum price index in Gedaref, Sudan (2008-2013)**



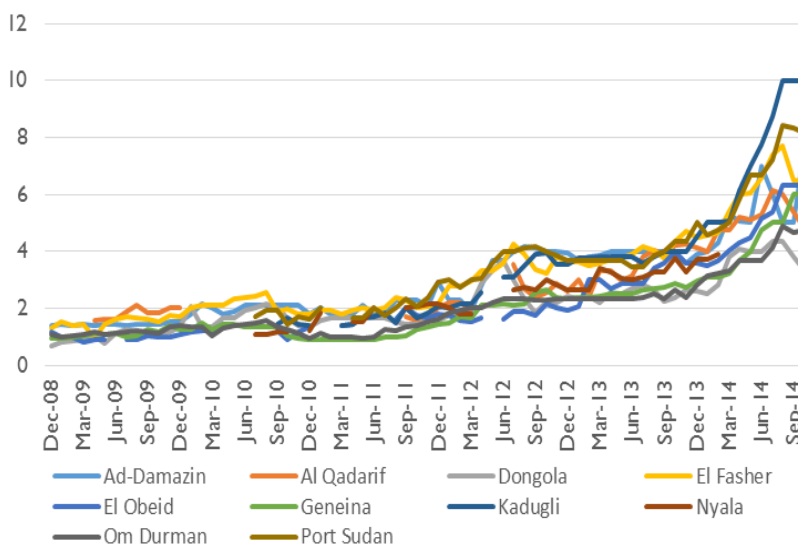
Source: FEWS NET calculation from FARMERS data.

### 3.5 Sorghum price trends

**Sorghum price trends in Sudan vary considerably within and between years.** Sorghum prices in surplus-producing Gedaref are among the lowest, while the highest prices are found in structurally deficit Port Sudan.

**Sorghum prices in Sudan are highly correlated across markets (Figure 14 and Table 7).** This means a high degree of co-movement among sorghum prices across spatially dispersed markets in Sudan. This is in part a reflection of the common factors driving market supply and demand across time and space.

**Figure 14 Sorghum prices in Sudan (SDG/kg), 2008-2014**



Source: FARMERS.

The long-term increasing trends depicted in Figure 14 are a reflection of the general macroeconomic environment (section 2.6). This has led to generalized price inflation for both staple foods and nonfood items. Within years, market supplies vary from the post-harvest period to the lean season, resulting in very strong seasonal trends (Figure 12). Furthermore, although storage capacity exists in Sudan, end-of-season stocks are often quite low. Difficulties associated with storing sorghum from times of relative abundance times of relative scarcity result in highly variable prices.

**Table 7 Sorghum price correlations in Sudan**

	Gedaref	El Fasher	El Obeid	Geneina	Kadugli	Nyala	Um Durman	Port Sudan
Gedaref	1							
El Fasher	0.96	1						
El Obeid	0.93	0.94	1					
Geneina	0.91	0.95	0.96	1				
Kadugli	0.87	0.95	0.95	0.98	1			
Nyala	0.92	0.90	0.93	0.93	0.93	1		
Um Durman	0.93	0.97	0.95	0.98	0.97	0.91	1	
Port Sudan	0.88	0.96	0.93	0.97	0.98	0.91	0.98	1

Source: FEWS NET calculation from FARMERS data.



## 4. Wheat

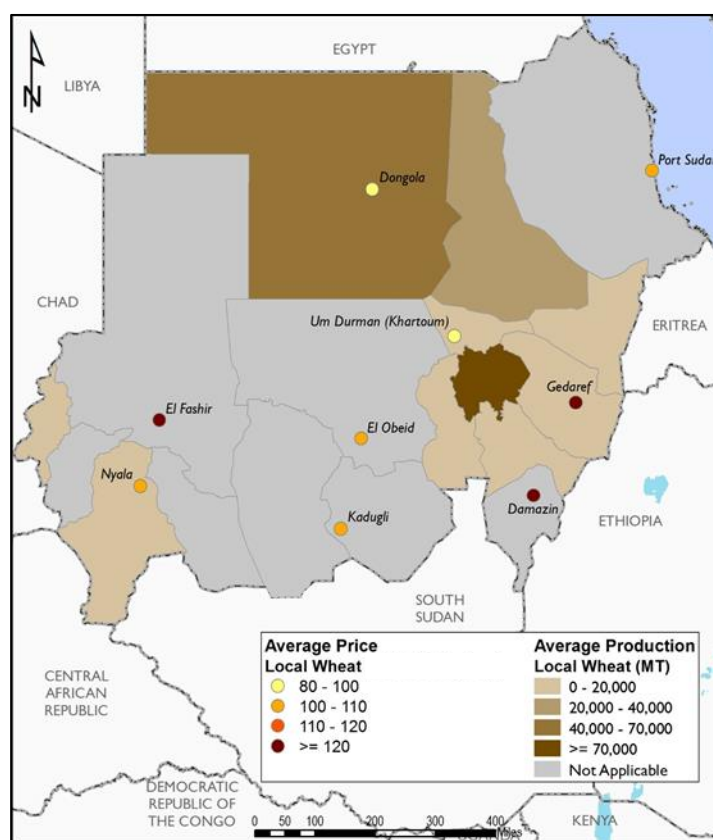
**Wheat is the second most important staple food in Sudan, accounting for, on average, 33 percent of total food availability (Table 1).** Availability is assured through local production (15-25 percent of national wheat supply) and imports (over 75-85 percent of national wheat supply). The national wheat marketing system is segmented according to the source and final end use. Locally produced wheat is traded through the national marketing system and used primarily for the preparation of traditional foods (*kisra/Gurassa*). Wheat grain is imported from international markets and then distributed along vertically integrated marketing channels dominated by the country's largest wheat milling industries. Industrially milled wheat is then distributed to bakeries countrywide. Locally produced wheat is generally traded over relatively short distances, compared to sorghum and imported wheat (Figure 21). Distinct marketing channels exist for local versus imported wheat (Figure 19). Indeed, it is rare to find imported wheat grain on local markets.

### 4.1 Wheat consumption trends

**Wheat consumption has grown rapidly over the past 15 to 20 years, and production increases have not been sufficient to meet demand as discussed above (Figure 17).** As an

illustration of how consumption patterns have changed, the traditional sorghum and millet-based flat bread (*kisra*) is now baked by urban households just one day per week or on holidays. Similar changes in eating habits are occurring across the country's rural areas, where many farm families now sell part of their sorghum and millet harvest to have money to purchase bread. Even internally displaced persons (IDPs) in IDP camps in Darfur and other parts of the country have been frequently observed selling a portion of their sorghum ration to buy bread (FEWS NET 2014). Consumption of bread is also appealing to households as the price is subsidized and sold at a fixed price, whereas traditional grain prices vary widely. Khartoum is the nation's largest wheat (local and imported) consumption center. **By some estimates 70,000 to 80,000 50-kg bags of wheat flour are consumed per day by consumers in Khartoum, which represents about one-quarter of the country's population (36.1 million).**

**Figure 15 Average wheat production (MT) and prices (SDG/100-kg bag), by state, 2009/10-2013/14**



Source: Compiled by FEWS NET from FSTS data.

Note: Average prices presented are four-year average prices (2010-2013) expressed in real 2007=100 prices). Average production levels presented are ten-year average production levels (2003/04-2012/13).

## 4.2 Wheat production trends

Annual local wheat production in Sudan for the last five years ranged from 300,000-500,000 MT, covering less than 15-25 percent of the annual national wheat requirements (Table 1 and Figure 17). The main wheat production areas are the irrigated systems in Gazeira, Rahad, and Halfa El Gadeeda States, which account, on average, for approximately 50 percent of national wheat production. Likewise, some limited irrigated wheat production occurs in Northern, River Nile, and White Nile States (SIFSIA 2011). A negligible quantity of rainfed wheat is produced in the Jebel Mara area of West Darfur, and used directly for local consumption.

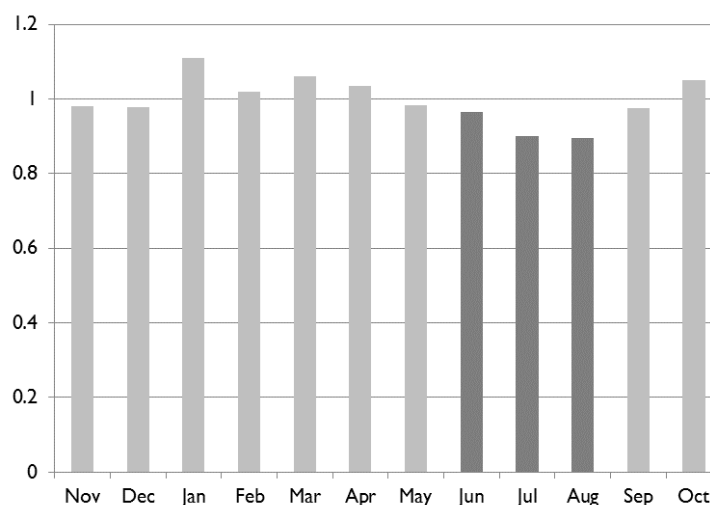
Wheat production in Sudan has consistently been supported by government interventions, either through provision of subsidized inputs and credits or through earlier price setting to encourage farmers and local producers to increase their areas of wheat. However, domestic wheat production rarely exceeds 15-25 percent of the domestic requirements due to many factors, including poor, erratic water availability for both irrigated and rainfed systems, as the winter wheat production season in Sudan is usually short and unpredictable. Above-average heat during the winter months also contributes to low wheat yields.

March to April is the main wheat harvest period in Sudan, with marketing starting between the end of April and the beginning of May. During this immediate harvest and post-harvest period, local wheat prices typically decline temporarily, particularly in the country's main production areas (Figure 16). Imports from international markets, on the other hand, take place throughout the year by contracted companies and the SRC based on local wheat production expectations. Wheat imports from international markets (Canada, Australia, and Black Sea States) have increased considerably during the last ten years (Figure 17), with average annual imports in the period 2004 to 2013 nearly double those from 1994 to 2003. More recently, Sudan imported over two million metric tons (MMT) of wheat grain, or approximately 75-85 percent of the national annual wheat requirement of 2.4 MMT.

## 4.3 Wheat import trends

The Sudanese government and private sector's ability to import such large quantities of wheat from international markets depends on many factors, including global wheat prices and availability, the exchange rate, and the availability of foreign currency, among others. The Central Bank of Sudan is the main source of foreign currency for wheat importers in Sudan, thereby putting an increasing burden on the national treasury as import requirements increase and during periods of high and increasing international wheat prices. Since secession of South Sudan in July 2011, it is estimated that Sudan has lost 75 percent of its revenues from crude oil, previously a key source of foreign currency (IMF 2013). In an effort to cope with the new economic situation, the GoS has put into place a bundle of economic measures since early 2012 that aim to control local currency depreciation and reduce the overall government budget deficit.

Figure 16 Average seasonal wheat price index in Dongola, Sudan



Source: FEWS NET calculation from FARMERS data.



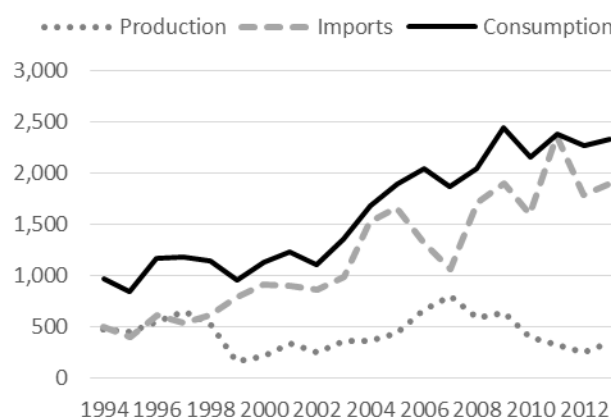
Despite these efforts, the SDG depreciated by nearly 50 percent in 2013, thereby increasing the FOB price of imported commodities, including wheat (Figure 18). As part of the new policies, the GoS removed the wheat import tariff in 2013 to mitigate the effects of high prices on consumers. In addition to removing the import tariff, as of early 2014, the GoS subsidizes the exchange rate that a small number of importers (10-15) are subject to. For example, in March 2014, the Interbank exchange rate was approximately 5.9 SDG/USD, but milling wheat importers were able to import using a rate of just 2.9 SDG/USD with the assistance of the government (FEWS NET 2014).

Informal exports of small quantities of wheat flour from rural markets to neighboring small markets in Chad, South Sudan, and Eritrea are very common. The main cross-border wheat trade corridor from Sudan is through the border crossing point in El Jabalain in White Nile State, bordering Upper Nile State in South Sudan where small quantities of wheat flour exports are very common during the dry season. There are also exports into Eritrea through the Al Laffa border point in Kassala State.

#### 4.4 Key actors in Sudan's wheat markets

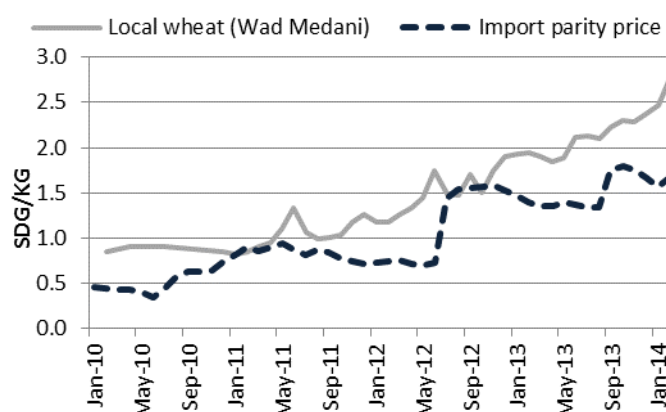
The GoS held a monopoly on wheat imports prior to 1996. At that time, imported grain was allocated to 20 small milling companies via a quota system, through which wheat was sold at subsidized prices to keep bread prices down. Since the wheat milling sector was liberalized in 1996, the country's three largest milling groups (Sayga Flour Mills, Wheata Flour Mills, and Seen Flour Mills) have dominated wheat imports, milling, and distribution. Sayga relies entirely on imports from the Australian Wheat Board while Wheata (which started operations in 2001) relies entirely on imports from the Canadian Wheat Board. Seen took over the former government mill and other small, failed private mills throughout the country and relies on special access to domestic wheat production combined with imports from Black Sea States. The SRC annually imports wheat –based on needs estimations –as part of Sudan's strategic reserve, which is mostly sorghum. Some of these quantities managed by the SRC are sold to small-scale traders and millers, but the majority is eventually distributed to the three largest milling companies cited above (Figure 19).

Figure 17 Sudan's wheat production imports and consumption (000s MT), 1994-2013



Source: Sudan MoA and SRC.

Figure 18 Local wheat and import parity prices (SDG/kg)



Source: FEWS NET calculations using FARMERS, World Bank, and Oanda data.

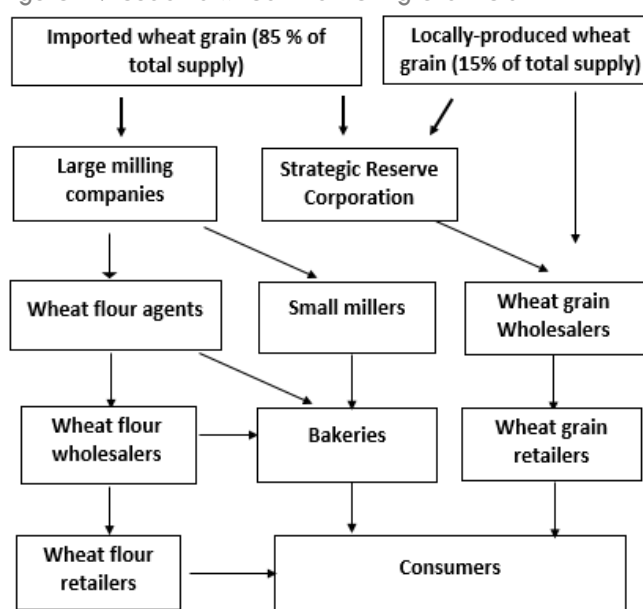
Note: Import parity prices based on U.S. international reference prices and official Interbank exchange rate.

**As a seaport, Port Sudan is the main entry point for imported wheat for the entire country.** Most of the milling companies mentioned above operate storage facilities in Port Sudan. As of mid-2013, the steel silo storage capacity for wheat in Port Sudan was approximately 240,000 MT. Most imported wheat grain transits from Port Sudan to Um Durman (Khartoum), which receives over 80 percent of imported grain for milling by the large processing firms. Most of the industrially milled wheat flour supply in Sudan therefore originates from Khartoum. The remaining 20 percent of imported grain is distributed to industrial milling facilities elsewhere in the country, including Atbara, where Sayga operates one mill. Once the milling process is complete, wheat flour is distributed throughout the country by agents of the milling companies or wholesale traders based in Khartoum.

#### 4.5 Key wheat trade markets

**Over 20 main wheat consumption markets in Sudan source important quantities of wheat flour from Khartoum (and, to a lesser extent, Atbara).** These include Gadarif and Senga to the southeast, Madani in El Gezera State in central Sudan, Rabak in White Nile State in central west Sudan, Dongola in Northern State, Kadugli in South Kordofan State, El Fula in East Kordofan State in the southwest, El Obied in North Kordofan State and Nyala in South Darfur State in the western part of the country, which then supplies El Fasher, Genenina, Zalengi, and El Dea'ain markets in the five Darfur States. El Obied Market in North Kordofan State is the main source for wheat flour to most retail markets in that state (for example, El Nuhood and Bara and some markets in West Kordofan State (Abuzabad) in addition to some neighboring markets in North Darfur State (Al La'ait)). Road access between Khartoum and the Darfur States has improved recently with the construction of the tarmac Salvation road. As a result, Um Kaddada market in the eastern part of North Darfur State has started to receive wheat flour directly from Khartoum.

Figure 19 Sudan's wheat marketing channels



Source: FEWS NET, in consultation with private sector, donor, and humanitarian community key informants.

#### El Obeid Market Profile

- El Obeid Market, located in North Kordofan State, is among the largest grain markets in central Sudan.
- Trade in El Obeid Market is focused mostly on cash crops (with well-organized trader groups), followed by grains and livestock.
- El Obeid plays a key role in trade between the eastern surplus-producing states and the western Darfur States.
- Storage capacity is between 40-50,000 MT, owned and managed by three commercial banks and the WFP.

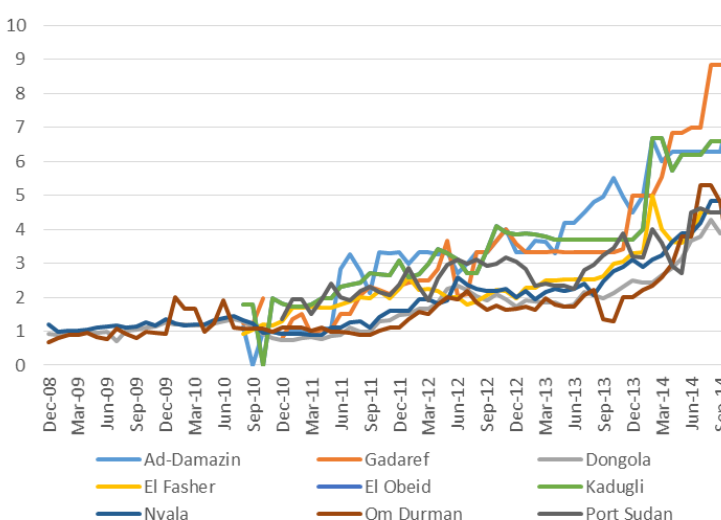
Source: FARMERS/FSTS/FEWS NET.

**The key markets for locally produced wheat are located in main production areas.** These include Dongola in the Northern State, El Damer in River Nile State, Madani in El Gazeira State, Kosti in White Nile State, and Halfa El Gadedda in Kassala State. There are typically important quantities of domestic wheat production sold to the SRC at prices set before the wheat production season starts (as part of the interlinked contract between producers and ABS, which provides access to credit, inputs, and machinery) and to Seen mills in Khartoum.<sup>11</sup> In most cases, the SRC use its wheat stock to stabilize wheat prices in local markets by buying when prices are low and selling when prices are high and to support some smaller mills during periods of scarcity. The Jebel Mara area in West Darfur State also produces small quantities of wheat that mainly supply local markets within Darfur. Wheat producers, agents, and larger traders handle the supply of wheat flour to wholesale traders in the main markets as well as to bakeries in Khartoum. Wholesalers supply retailers.

#### 4.6 Wheat price trends

As discussed above, national wheat supply and price trends are driven by local and international dynamics. Nevertheless, much like sorghum and millet, wheat trends vary considerably within and between years (Figure 20). Average annual price increases in key production areas (Dongola) occur around January, ahead of the wheat harvest period in March (Figure 16). Much like those of the other grains, wheat prices are highly correlated across the country (Table 8). However, wheat prices in Um Durman (Khartoum) are less correlated with the larger marketing system than are prices of locally produced sorghum and millet. This may reflect the very large population of wheat consumers in Khartoum and the availability of substitute imported wheat.

**Figure 20 Wheat prices in Sudan (SDG/kg), 2008-2014**



Source: FARMERS.

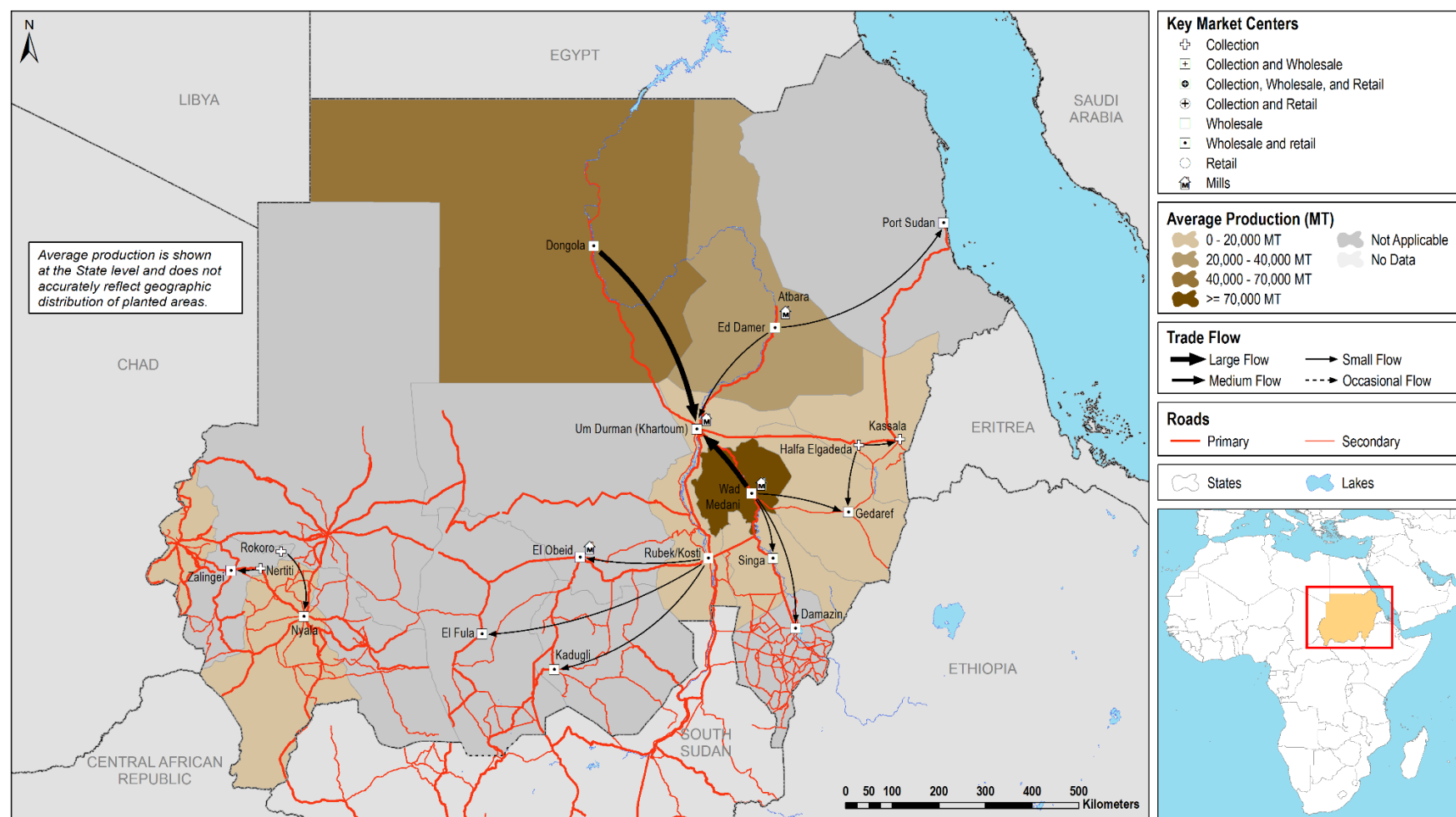
**Table 8 Wheat price correlations in Sudan**

<sup>11</sup> Under this kind of arrangement, the farmer can pay back loans either in cash (to the ABS) or in kind (to the SRC).

	Ad-Damazin	Gedaref	Dongola	El Fasher	El Obeid	Kadugli	Nyala	Um Durman	Port Sudan
Ad-Damazin	1.00								
Gedaref	0.89	1.00							
Dongola	0.88	0.95	1.00						
El Fasher	0.90	0.90	0.86	1.00					
El Obeid	0.92	0.93	0.90	0.93	1.00				
Kadugli	0.89	0.93	0.97	0.88	0.90	1.00			
Nyala	0.91	0.96	0.98	0.90	0.92	0.96	1.00		
Um Durman	0.75	0.90	0.93	0.82	0.84	0.91	0.90	1.00	
Port Sudan	0.81	0.84	0.89	0.82	0.82	0.87	0.88	0.79	1.00

Source: FEWS NET calculations from FEWS NET data.

Figure 21 Sudan local wheat production and trade flow map



Source: FEWS NET Production and Trade Flow Maps provide a summary of the geography of marketing systems that are relevant to food security outcomes during an average marketing year or season. The maps are produced by FEWS NET in collaboration with stakeholders from local government ministries, market information systems, NGOs, and private sector partners, using a mix of qualitative and quantitative data (Annex 2).

**Disclaimer:** This map includes average wheat production at the State level in the background (brown shading). Those data are from the MoA.

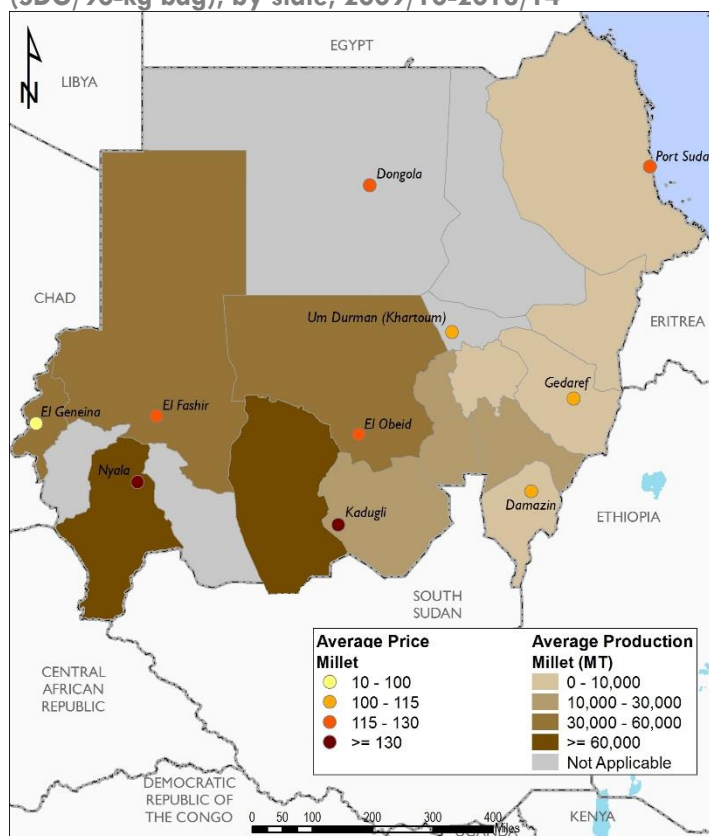
## 5. Millet

**Millet is a key staple food for poor households in the western part of Sudan (Darfur States).** A large share of local millet production is also believed to be used as horse feed, particularly in urban areas.<sup>12</sup> Millet is the second most important grain produced in Sudan (in terms of quantity produced), but the third most important in terms of total availability and consumption (Table 1). On average, over 90 percent of millet production is grown in traditional production systems (FSTS 2014). The scale of production and lack of more modern production techniques makes it more at risk to drought and conflict-driven production variations. Indeed, millet's interannual production variability is greater than that of sorghum or wheat. Production is highest across the Darfur States and North Kordofan State, which jointly account for over 80 percent of national millet production (Figures 22 and 25). Limited volumes of millet are likewise grown in Gedaref, Sennar, White Nile, and Blue Nile States, where millet is grown primarily for in-kind payments to migrant agricultural laborers from the western and central regions of the country. Because millet is largely grown in the traditional sector, the extent of ABS and SRC involvement through input provision or stock and trade management is very limited.

### 5.1 Key actors in Sudan's millet markets

**Fewer key actors are involved in the millet marketing system than in sorghum and wheat markets, resulting in relatively short and straightforward marketing channels (Figure 23).** The ABS and the SRC are involved in national millet financing and marketing in a very limited way and no industrial millet processing exists. The timing of key production and marketing events is very similar between sorghum and millet (Figure 5). The only

**Figure 22 Average millet production (MT) and prices (SDG/90-kg bag), by state, 2009/10-2013/14**



Source: Compiled by FEWS NET from FSTS data.

### Nyala Market Profile

- Nyala Market, located in South Darfur State, is among the most important millet trade markets in western Sudan.
- Trade in Nyala Market is focused mostly on staple foods and cash crops, while livestock trade has been gravely disrupted by a decade of protracted conflict.
- Extensive quantities of in-kind food aid (sorghum and wheat) are also sold in Nyala Market due to ongoing humanitarian operations in the area.

Source: FARMERS/FSTS/FEWS NET.

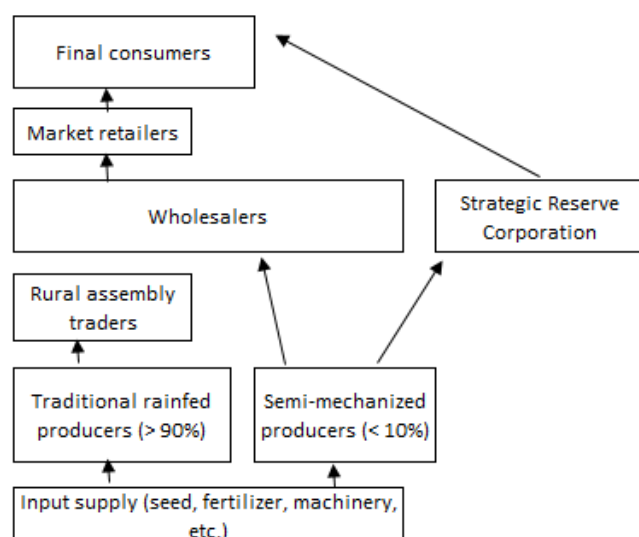
<sup>12</sup> Experts in the field have indicated that the use of sorghum and millet for horse feed has grown in recent times, but this issue merits further investigation before it will be possible to quantify the importance of that use. The 2013/14 national grain balance sheet suggested that just 5 percent of millet was used for livestock feed. It is possible these numbers are greatly underestimated.

major exception is that, as discussed above, millet is generally traded over much shorter distances and involves fewer actors.

## 5.2 Key millet trade markets

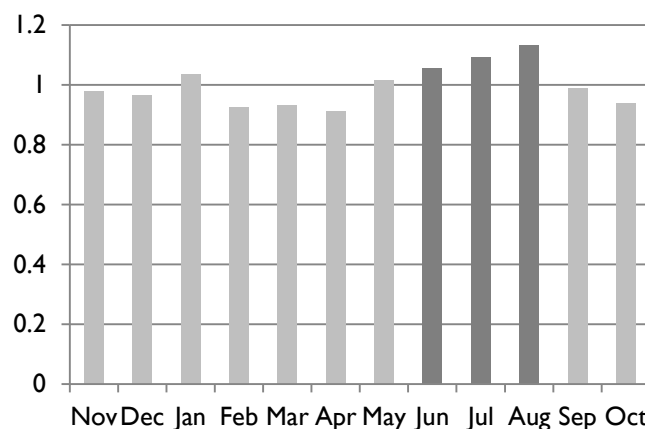
The largest millet trade market (in terms of quantities traded) is Nyala, in the heart of the surplus-producing South Darfur State (Figure 25). Other key markets include El Fasher (North Darfur State) and Geneina (West Darfur State). Millet markets in the Darfur States have been greatly affected by years of persistent conflict, which has negatively affected production and regularly constrained the movement of commodities from production to consumption zones due to insecurity and associated increased marketing and transaction costs. Another key market is Saraf Omra (North Darfur State). When looting and conflict break out in Saraf Omra, the effects are immediately felt in El Fasher, which depends heavily on Saraf Omra for supplies. As highlighted in previous sections, the bulk of national grain storage capacity is concentrated in Port Sudan, Khartoum, and the western states. Relatively lower production volumes and storage capacity in key production areas coupled with higher production variability make for generally thinner millet markets (lower quantities traded) and more variable prices.

Figure 23 Sudan's millet market actors



Source: FEWS NET.

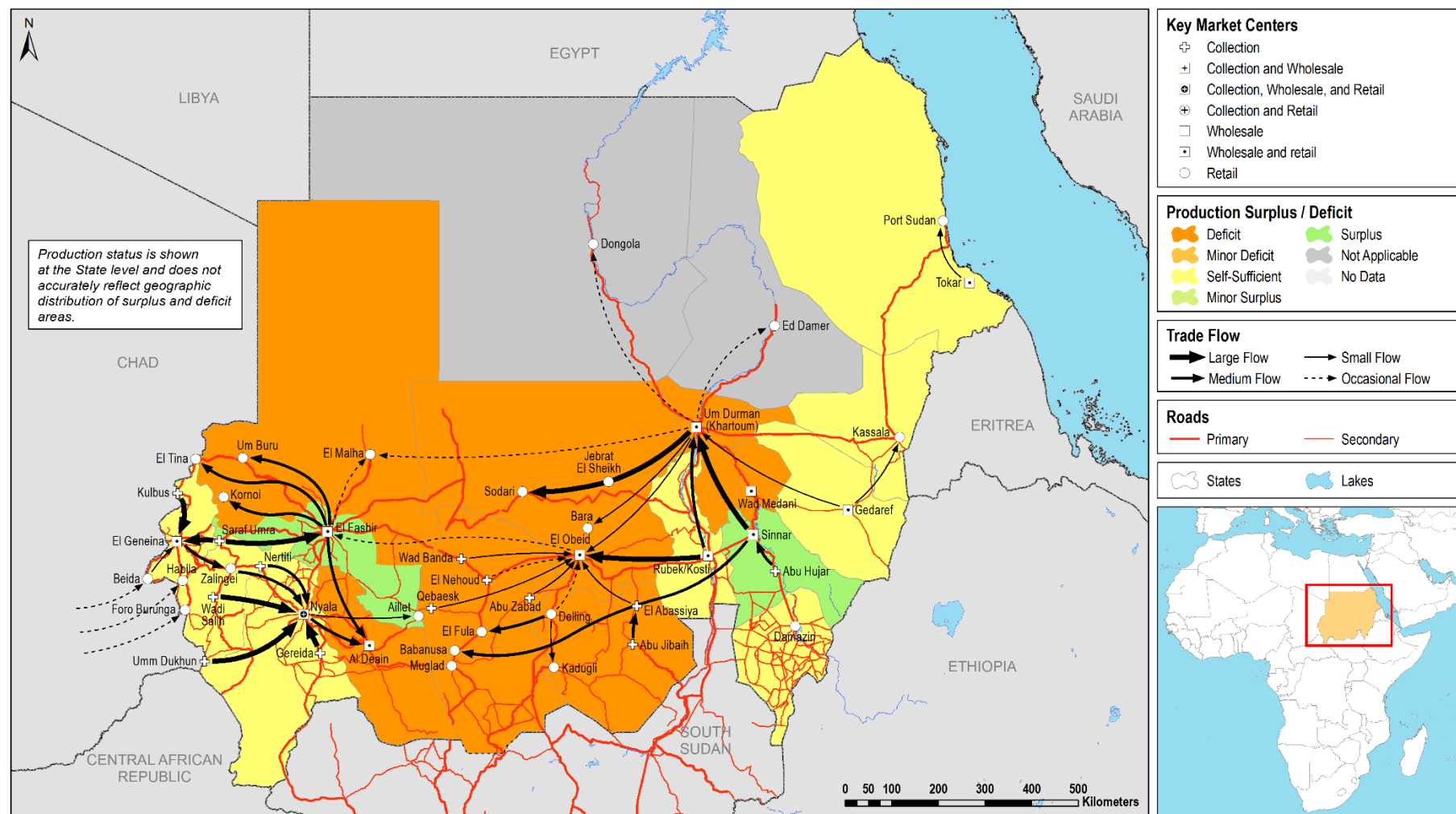
Figure 24: Average Seasonal Millet Price Index in Nyala, Sudan



Source: FEWS NET calculation from FARMERS data.



Figure 25 Sudan millet production and market flow map



Source: FEWS NET Production and Trade Flow Maps provide a summary of the geography of marketing systems that are relevant to food security outcomes during an average marketing year or season. The maps are produced by FEWS NET in collaboration with stakeholders from local government ministries, market information systems, NGOs, and private sector partners, using a mix of qualitative and quantitative data (Annex 2).



### 5.3 Millet marketing

Unlike the Sudanese sorghum and wheat markets, which involve regional and/or international markets, millet is traded in much smaller quantities and over shorter distances (Dorosh and Subran 2009). Millet imports from international markets only take place during years of crisis, when the government imports grain to meet domestic food needs. Likewise, some limited cross-border trade flow occurs in border areas with Chad (imports) and South Sudan (exports). Key informal cross-border trade points include Geneina, an important wholesale and retail market in West Darfur State, bordering Chad, as well as the smaller border area collection markets of Beida, Habila, and Foro Baranga, through which millet is imported from Chad. Limited volumes of exports flow through the border area of Um Darfug toward the Central African Republic (CAR). Within Sudan, the millet marketing system is generally divided between the eastern and western states, with only limited long-distance trade (Figure 25). Millet trade is most dynamic in the Darfur States. During a normal year, North and West Kordofan States are generally as far west as any trade flows from White Nile or Sennar States will travel. Occasionally, there are trade flows from Sudan's main production zones toward the north, but only in limited quantities.

#### El Fashir Market Profile

- El Fashir Market, located in North Darfur State, is among the most important millet trade markets in western Sudan.
- Trade in El Fashir Market is focused mostly on cash crops (with well-organized trader groups), followed by grains and livestock. The El Fashir Market is linked to markets in central Sudan (El Obeid and Omdurman) as well as some local surplus areas such as Saraf Omra.
- Storage capacity is estimated at 30-40,000 MT.

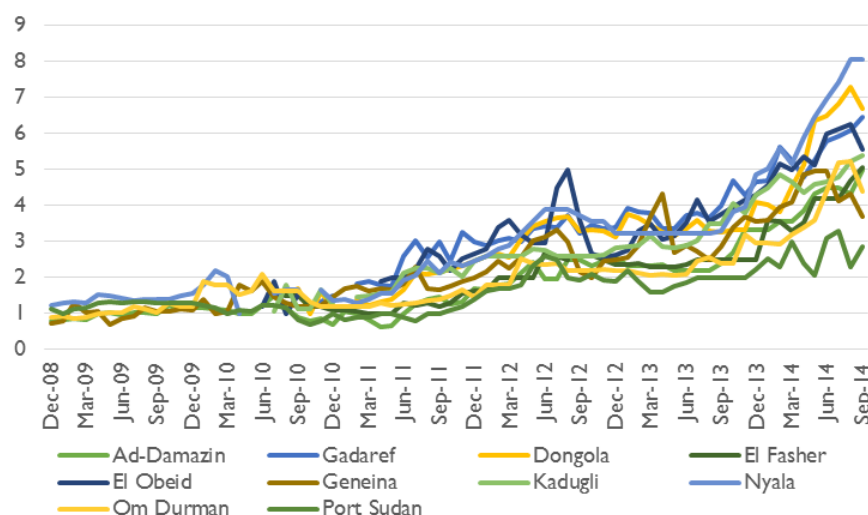
Source: FARMERS/FSTS/FEWS NET.

### 5.4 Millet price trends

Millet markets are generally thinner (with lower volumes transacted) than those of sorghum or wheat. Millet price trends are nevertheless similar to those of wheat and sorghum, each showing high degrees of seasonality and a long-term upward trend (Figure 26). A higher degree of interannual supply variation also contributes to higher variability in prices from one year to the next.

Millet prices in Geneina, in the westernmost part of Sudan, are the least correlated with the remainder of the national

Figure 26 Millet prices in Sudan (SDG/kg), 2008-2014



Source: FARMERS.

Source: FEWS NET.

**marketing system.** Prices in El Fashir and Nyala, which are among the most dynamic millet markets, are among the most correlated with markets in central and eastern Sudan (Table 9).

**Table 9 Millet price correlations in Sudan**

	Ad-Damazin	Gedaref	El Fasher	El Obeid	Geneina	Kadugli	Nyala	Um Durman
<b>Ad-Damazin</b>	1.00							
<b>Gedaref</b>	0.97	1.00						
<b>El Fasher</b>	0.97	0.95	1.00					
<b>El Obeid</b>	0.91	0.91	0.91	1.00				
<b>Geneina</b>	0.87	0.85	0.85	0.85	1.00			
<b>Kadugli</b>	0.95	0.98	0.93	0.90	0.86	1.00		
<b>Nyala</b>	0.97	0.96	0.98	0.93	0.85	0.94	1.00	
<b>Um Durman</b>	0.94	0.92	0.94	0.91	0.84	0.91	0.97	1.00

Source: FEWS NET calculations from FARMERS data.

## 6. Key Remaining Information Gaps

**Two main bodies of research could help improve the understanding of staple food markets in Sudan.** First, in official figures, livestock consumption constitutes a very limited component (5 percent) of aggregate grain consumption (demand) nationwide (FSTS 2014). However, anecdotal reports indicate this may be gravely underestimated, due largely to a lack of reliable data and information about livestock feeding practices. This is particularly the case in urban centers, where poultry and dairy production have intensified and expanded in recent years. Furthermore, relief aid (grain) has reportedly been used as livestock feed in the Darfur States since the variety of grain provided is typically not households' preferred quality (Buchanan-Smith and Jaspars 2007). A better understanding of the contribution of livestock demand to aggregate sorghum and millet consumption will improve the understanding of the drivers of food prices and improve the national cereal balance estimates, which are used to estimate national and subnational food deficits.

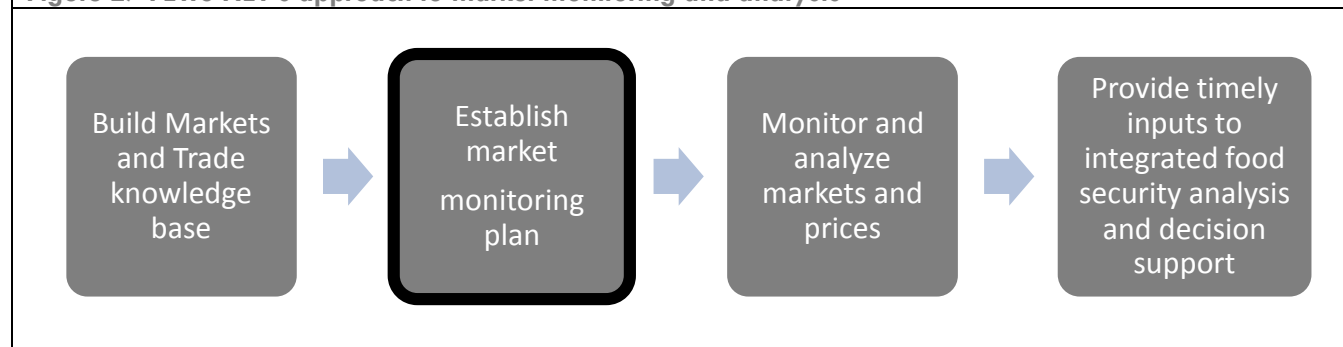
**Second, this report points to some of the likely long-term impacts of conflict on markets in the Darfur States, as well as the varying impacts of in-kind versus cash and voucher programs on marketing functioning (including trader incentives and local price levels and variability).** The 2014 study now underway by Tufts University will help inform the design of such programs in the future in response to changing local market dynamics (for example, years of very good local and national production versus years of very poor production, and therefore limited national grain supplies).

## 7. Market Monitoring Plan

The components of the following market monitoring recommendations for Sudan draw on the findings from the preceding Staple Food Market Fundamentals report, a key component of FEWS NET's Markets and Trade Knowledge base for Sudan (Figure 27). FEWS NET regularly monitors staple food market dynamics in both presence and RM countries. It is neither necessary nor possible for FEWS NET to effectively monitor all commodities markets at all times. Rather, the Markets and Trade Knowledge team focuses on monitoring the status of a select group of indicators over a given marketing year. Those key indicators include the status of key activities and events that are likely to influence market supply and demand dynamics and the resulting price levels

and variability in key reference markets. FEWS NET also regularly monitors incentives for trade flows out of areas of relative abundance into those of relative scarcity. Some of these indicators have threshold values that are used in practice, in combination with other information, to suggest when one might have reason to be concerned about food availability and/or access at a national, state, or local level. The results of such monitoring are regularly reported in FEWS NET's Price Watch and Price Watch Annex and also serve as essential inputs into the FEWS NET project's integrated food security analysis.

**Figure 27 FEWS NET's approach to market monitoring and analysis**



**Table 10 Sudan market monitoring plan**

Staple food supply: Aggregate domestic food availability is largely assured through domestic production and international wheat imports	
<b>Domestic sorghum supply Indicators</b>	<ul style="list-style-type: none"> <li>• June-August: Carryover stocks. <i>On average, 170,000 MT, less than 5% of total sorghum availability.</i></li> <li>• June-December: Input costs (labor in particular).</li> <li>• August-September: Pre-harvest estimates in surplus-producing areas of Gedaref, Geziera, and Sennar States in particular.</li> <li>• October-December: Harvest prospects and marketing behavior in surplus-producing areas.</li> <li>• January-March: Sorghum stock levels in surplus-producing areas.</li> <li>• Year-round: SRC purchase and export plans. <i>Exports of 500,000 MT considered high and likely to influence carryover stocks for following marketing year.</i></li> </ul>
<b>Domestic millet supply indicators</b>	<ul style="list-style-type: none"> <li>• June-August: Carryover stocks. <i>On average, quite limited.</i></li> <li>• August-September: Pre-harvest estimates in surplus-producing areas of West Darfur, South Darfur, and the southern areas of North Darfur States in particular.</li> <li>• October-December: Harvest prospects and marketing behavior in surplus-producing areas.</li> <li>• January-March: Millet stock levels in surplus-producing areas.</li> </ul>
<b>Domestic wheat supply indicators</b>	<ul style="list-style-type: none"> <li>• January-February: Carryover stock levels.</li> <li>• February-March: Pre-harvest estimates in surplus-producing areas.</li> <li>• April-May: Harvest prospects and marketing behavior in surplus-producing areas.</li> </ul>
<b>International wheat import supply indicators</b>	<ul style="list-style-type: none"> <li>• Year-round: Monitoring of international wheat market trends, exchange rate (official, black market, and subsidized), and incentives for imports (see section on incentives for trade flows).</li> </ul>

Table 10 Market monitoring plan (con't.)	
<b>Staple food demand: Domestic staple food demand is driven by household incomes, population size, derived demand for livestock feed, and prices relative to neighboring countries</b>	
Income sources (year-round)	<ul style="list-style-type: none"> <li>Seasonal monitoring of agricultural incomes, particularly those from cash crop (sesame) and livestock (sheep) sales.</li> <li>Regular monitoring of other important national income sources, such as off-farm income (gold mining).</li> <li>Humanitarian assistance in intervention areas, including how cash transfers are spent and how in-kind donations are used (consumed or sold).</li> </ul>
Population size, density, and movement	<ul style="list-style-type: none"> <li>The presence of migrants or displaced populations that may put pressure on market systems.</li> </ul>
Livestock feed demand	<ul style="list-style-type: none"> <li>Year-round: Local fodder availability and livestock density and implications for livestock feed demand.</li> </ul>
Export demand	<ul style="list-style-type: none"> <li>Year-round: Competitiveness of domestic prices in regional markets (South Sudan, Ethiopia, Chad).</li> </ul>
Consumer preferences	<ul style="list-style-type: none"> <li>Year-round: Consumer preferences for certain types of staple foods. <i>These preferences are likely to change slowly over time, but may be influenced by relative grain prices and the presence of relief commodities.</i></li> </ul>
<b>Staple food prices: Markets to monitor price levels for key commodities (year-round)</b>	
Sorghum prices	<ul style="list-style-type: none"> <li>Gedaref, Khartoum, El Obeid, El Fasher, Sinnar, and Kosti. <i>Sorghum prices should decline in the pre- and post-harvest period, stabilize, and then increase gradually over the lean season when market purchases are most intense.</i></li> </ul>
Millet prices	<ul style="list-style-type: none"> <li>Geneina, Nayala, El Fasher, and Gedaref. <i>Millet prices should decline in the pre- and post-harvest period, stabilize, and then increase gradually over the lean season when market purchases are most intense.</i></li> </ul>
Wheat prices	<ul style="list-style-type: none"> <li>International, Khartoum, Dongola, and Madani.</li> </ul>
Livestock-to-grain terms of trade	<ul style="list-style-type: none"> <li>This is an important food access indicator. <i>The threshold value often used is four sacks of grain per head of sheep.</i></li> </ul>
<b>Incentives for trade flows: Price differentials (simple price spread) and road barriers or trade along key marketing corridors (year-round)</b>	
<ul style="list-style-type: none"> <li>El Obeid → Nyala</li> <li>El Obeid → El Fashir</li> <li>Um Durman → El Obeid</li> <li>Chad → Sudan (via Geneina)</li> <li>Kosti → Kadugli</li> <li>Gedaref → Um Durman</li> <li>Sinnar → Um Durman</li> <li>Geziera → Um Durman</li> <li>Damazini → South Sudan</li> <li>International wheat markets → Sudan (wheat)</li> <li>Sudan (sorghum) → international and regional sorghum markets</li> </ul>	
<p><i>Positive price differentials along these marketing corridors indicate that trade flows may be possible (profitable) for the private sector. An analyst would want to pay special attention to incentives for trade flows into structurally deficit areas during years of below-average production. Marketing costs (including transportation) will vary from year to year but should be monitored as well.</i></p>	

**Annex 1. Workshop Participants' Names and Organizations**

<b>Name</b>	<b>Organization</b>
Dr. Adil Farah Idris	Food Security Technical Secretariat/MoA
Nawal Sid Ahmed Zain Alabdeen	Food Security Technical Secretariat/MoA
Rehab Yassin Nimer	Food Security Technical Secretariat/MoA
Bakhita Mahgoob Alshafee	Marketing Section/MoA
Azhari Mahjoob Farah	Agricultural Planning Unit/MoA
Hala Hamid Alamin	Sudan Trade Point/Ministry of Trade
Abed Alsalm Hassan	Strategic Reserve Corporation/Agricultural Bank of Sudan
Mohamed Zakaria	Darfur Development and Reconstruction Agency (DRA)
Hassan Alsheikh Al Basheer	Private Consultant
Dr. Abed Algbar Abdallah Fadul	Private Consultant
Abboud Khaleel Bushara	OXFAM-America
Khalil Adam Mohamed	OXFAM-America
Yasmin Abed Algadir	WFP
Adam Hamid Sabeel	USAID – Food For Peace
Salma Rashid	USAID – Food For Peace
Mahmoud Daffala	USAID – Food For Peace
Sonja Perakis	FEWS NET
Julia Nagele	FEWS NET
Thomas Awuor	FEWS NET
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Yahia Mohamed Awad Elkareem	FEWS NET
Mohamed El Hafiz Ibrahim	FEWS NET

## Annex 2. Data Collection and Information Verification Methods

The analysis presented in this report draws on the combined knowledge provided by key informants, secondary data, and a literature review (grey literature and other published documents and reports). The data collection and verification process took place in four phases:

**First, FEWS NET collected secondary historical data related to staple food and cash crop production and marketing (sub-national production volumes, trade flows, and price data) as well as relevant key reports and publications.** These data and reports were reviewed to provide FEWS NET staff with general background information.

**Second, FEWS NET organized a national-level workshop with key informants** (private sector, the broader humanitarian and development community, government, and USAID and FEWS NET staff) over the course of two days to help improve the understanding of the key issues outlined above, including:

- a. **Cross-cutting issues that affect all staple food, cash crop, and livestock markets**
- b. **Commodity market structure** (including the relative importance of local production versus imports in aggregate food availability and access, including the geographic distribution of production and consumption, and key actors in the marketing chain)
- c. **Commodity market behavior/conduct** (purchase or selling behavior of key actors in the marketing chain)
- d. **Commodity market performance outcomes** (production trends, inter- and intra-annual price variability, and regional or international competitiveness)
- e. **Key indicators to monitor**

**In this workshop, the draft commodity-specific production and market flow maps and industry diagrams were sketched out.** The role of FEWS NET staff in the workshop was: to facilitate these conversations and discussions between various groups and individuals who might not normally have a chance to interact; to ask clarifying questions; and to take notes.

**Third, once the initial data and literature review and the workshop were completed, FEWS NET identified key remaining information gaps, which were then filled through follow-up conversations with key informants (those present at the workshop and newly identified individuals) and rapid field assessments.**

**Fourth, the draft report was reviewed by FEWS NET field office, regional office, and home office staff, as well as by key partners. The final version reflects comments and feedback from technical reviewers.**

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